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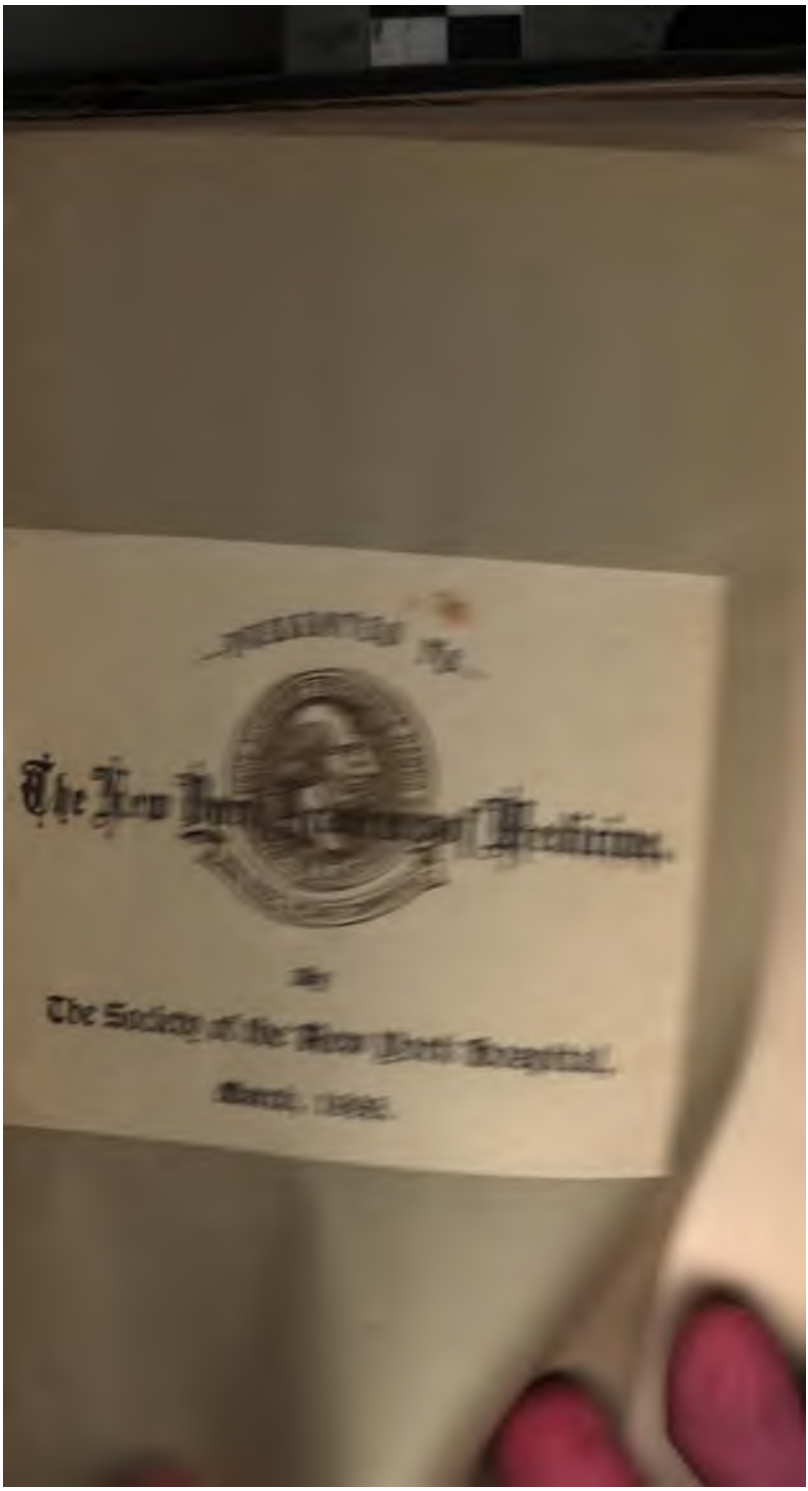

SURGICAL DISEASES

OF THE

OVARIES AND FALLOPIAN TUBES,

INCLUDING TUBAL PREGNANCY.

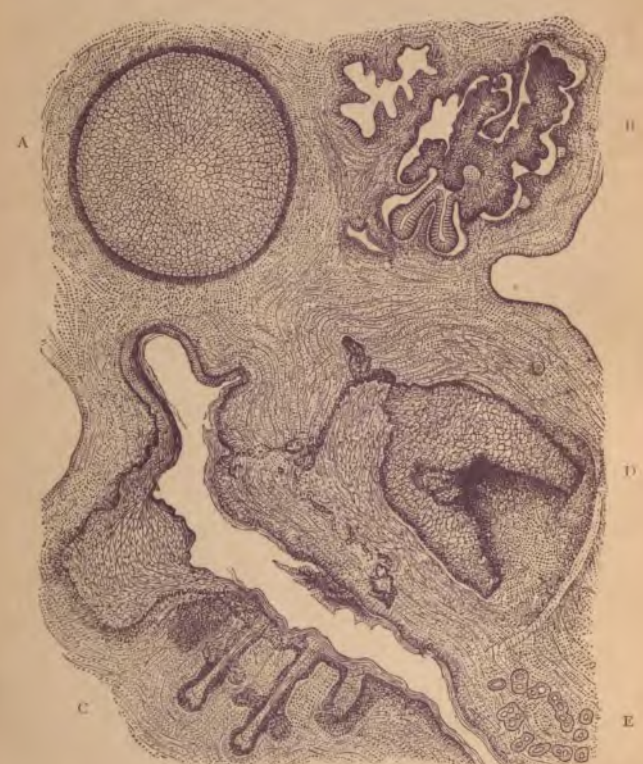

Plate I.—A Composite Drawing of the Microscopical Appearance of the Dermoid sketched in Fig. 23. (*Trans. Obstet. Soc.*)

A, An epithelial pearl in section; B, glandular tissue; C, developing hairs; D, a developing tooth; E, sweat-glands in section.

SURGICAL DISEASES

OF THE

Ovaries and Fallopian Tubes,

INCLUDING

TUBAL PREGNANCY.

BY

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PREFACE.

THE literature relating to Surgical Diseases of the Ovaries displays a notorious amount of egoism. Nearly every treatise devoted to this subject is mainly a record of personal experience. In some instances self-consciousness has been carried to such a degree that the books consist of little else than the clinical histories of patients coming under the observation of their authors.

In the present work a different plan has been followed, for though the book is largely based on personal investigation, full justice is done to the original work of other surgeons. This is a method rarely followed by those engaged in that section of surgical craft known by the grandiloquent term—Gynæcology.

Here and there use has been made of facts furnished by comparative pathology, especially in elucidating the nature of ovarian hydrocele, and in relation with menstruation and tubal

pregnancy. Any attempt to put the pathology of extra-uterine gestation on a sound basis is rendered difficult by the large number of erroneous assertions, or, as Jevons styled them, false facts, which abound in the literature of this important subject; they have retarded progress because it is often impossible to prove the falsity of records relating to specimens no longer in existence.

For some years Mr. Lawson Tait has been slowly planning the overthrow of the ridiculous notions taught concerning the pathology of extra-uterine pregnancy. Although fertile in critical methods, by which he has undermined these opinions, he has never objectively demonstrated the reality of his conceptions in such a way as to cause an unequivocal explosion. In the third section of this book I have attempted to assist in this useful iconoclastic endeavour. The time is not far distant when even teachers of midwifery will wonder how they could ever have believed that an impregnated ovum would grow upon the peritoneum.

Much care has been expended on the illustrations; all, with the exception of sixteen (the sources of which are duly acknowledged), are original, and produced under my personal

superintendence. In most I have introduced the plan of substituting words for reference letters. This is a novelty in surgical writing, but it has been so useful to anatomical authors that I feel no hesitation in adopting it.

J. BLAND SUTTON.

Queen Anne Street,
Cavendish Square, W.
October, 1891.

CONTENTS.

Part I.

DISEASES OF THE OVARIES.

CHAPTER		PAGE
I.	Sex; the Genital Gland of the Female; Secondary Sexual Characters; Menstruation	1
II.	Cystic Corpora Lutea; Apoplexy of the Ovary; Ovarian Concretions	14
III.	Malformations, Misplacement, and Atrophy of the Ovaries	22
IV.	The Pelvic Peritoneum	36
V.	Oöphoritic Cysts	44
VI.	Ovarian Dermoids	57
VII.	Solid Tumours of the Ovary	71
VIII.	Ovarian Tumours in Infancy and Childhood	83
IX.	Paroöphoritic Cysts and Warty Ovaries	93
X.	Parovarian Cysts	104
XI.	Ovarian Hydrocele	111
XII.	Secondary Changes in Ovarian Tumours, Inflammation, Suppuration, and Adhesions	123
XIII.	Axial Rotation	135
XIV.	Pressure Effects	147
XV.	The Diagnosis of Ovarian Tumours	163

CHAPTER		PAGE
XVI.	The Differential Diagnosis of Ovarian Tumours	183
XVII.	The Differential Diagnosis of Ovarian Tumours—Morbid Conditions of the Broad Ligament	203
XVIII.	Treatment of Ovarian Tumours	214

Part II.

DISEASES OF THE FALLOPIAN TUBES.

XIX.	The Fallopian Tubes	223
XX.	Salpingitis and its Effects: Pyosalpinx	235
XXI.	Tubo-Ovarian Abscess—Hydrosalpinx—Hæmatosalpinx	250
XXII.	Catarrhal Salpingitis in Relation to Adenoma of the Neck of the Uterus	265
XXIII.	Tuberculosis and Actinomycosis of the Ovary and Fallopian Tube	272
XXIV.	Neoplasms of the Fallopian Tube	280
XXV.	The Diagnosis of Salpingitis	289
XXVI.	The Treatment of Salpingitis and Oöphoritis	301

Part III.

TUBAL PREGNANCY.

XXVII.	Tubal Pregnancy	307
XXVIII.	Primary Rupture of the Gestation Sac	321
XXIX.	Tubal Abortion	326

CHAPTER		PAGE
XXX.	Tubal Gestation. The Placenta and Decidua; Secondary Rupture	333
XXXI.	Tubo-Uterine Gestation	348
XXXII.	Cornual Pregnancy	354
XXXIII.	Twin Gestation: One Fœtus Intra- the Other Extra-Uterine — Repeated Extra-Uterine Gestation	364
XXXIV.	Retention of the Fœtus	372
XXXV.	Tubal Gestation in the Lower Mammals	381
XXXVI.	The Diagnosis of Tubal Pregnancy	397
XXXVII.	The Treatment of Tubal Gestation	416

Part IV.

METHODS OF PERFORMING OPERATIONS FOR OVARIAN AND TUBAL DISEASE.

XXXVIII.	Ovariotomy	428
XXXIX.	Oöphorectomy	447
XL.	Irrigation and Drainage	452
XLI.	The Risks and Sequelæ of Ovariotomy and Allied Operations	459
XLII.	The Effects of the Removal of the Ovaries on the Secondary Sexual Characters of Women	475
Index to Names		489
Index to Subjects		492

LIST OF ILLUSTRATIONS.

COLOURED PLATES.

Microscopic Appearance of Sections from a Dermoid *Frontispiece*
An Ovarian Myoma . . . . . *To face page* 74
Echinococcus Colonies in the Broad Ligament ,, ,, 188
Microscopic Changes of the Tubal Mucous Membrane in Salpingitis . . . . . *To face page* 242
A Tubal Mole (Magnified) . . . . . ,, ,, 320

WOODCUTS.

PAGE

Ovary of a Woman twenty-three years old, with Fallopian Tube in position 2
Ovary from a Woman forty years of age 3
Section of Ovary showing ripening Follicles 4
Microscopical appearance of a transverse section of the Fallopian Tube of a Macaque Monkey (*Macacus rhesus*) during Menstruation 9
Apoplexy of the Ovary 18
Ovary with Cysts containing Concretions 20
Genital Organs of a pseudo-hermaphrodite 26
Uterus, Tubes, and Ovaries of an Infant one month old . . 31
Ovary and Tube of a Woman sixty-eight years of age . . 32
Atrophied and Crenate Ovary from a Woman thirty-nine years of age 34
Diagram representing the Cyst Regions of the Ovary . . 44
Incipient Oophoritic Cyst, etc. 45
Oophoritic Cyst 47
Section of Mucous Membrane from an Ovarian Cyst . . 48

PAGE

Unilocular Ovarian Dermoid 49
Human Ovary in section showing a Multilocular Cyst in an early stage 51
Portion of an Ovarian Adenoma showing the varieties of Loculi 53
Ovarian Adenoma presenting a Cutaneous Clump with a tuft of hair 54
Transverse section of an Ovarian Tumour from a Mare . . 55
Ovarian Dermoid, with a pseudo-mamma 59
Mammiferous Dermoid 60
Histological Characters of the Ovarian Mamma described by Velits 61
Ovarian Dermoid 62
Ovarian Teeth: showing Canines, Bicuspidate, and Multicuspidate Teeth 64
Microscopic characters of a Multicuspidate and Bicuspidate Ovarian Tooth 65
Ovarian Dermoid containing Brain-matter 66
Ovarian Dermoid from a Pregnant Woman 68
Ovarian Fibro-myoma 73
Section of an Ovary with secondary deposits of Melanotic Cancer 79
Cancer deposits in Ovary; secondary to Cancer of Breast . 80
Uterus and Ovaries of a Child two months old 83
Multilocular Ovarian Cyst from a Fœtus born at full time . 84
Tumour of the Ovary from a seven months' Fœtus . . . 85
Histological Characters of the Tumour of the Ovary of a seven months' Fœtus 86
Microscopical Characters of an Alveolar Oöphoroma . . 91
Paroöphoritic Cyst 94
Ruptured Paroöphoritic Cyst (right half of the specimen) . 96
Ruptured Paroöphoritic Cyst (left half of specimen) . . 97
Papillary Cyst growing between the layers of the Broad Ligament, near the Tubo-ovarian Ligament 99
Warty (not Paroöphoritic) Cysts of the Ovary 101
Warty Cyst, burrowing between the layers of the Mesosalpinx along the Tubo-Ovarian Ligament 102

PAGE
The Parovarium (semi-diagrammatic) 105
A Cyst of the Parovarium showing its relation to Ovary and Tube 106
Ovary and Stump of a Fallopian Tube, left after Axial rotation, ending in complete detachment of a Parovarian Cyst . 109
Ovarian Hydrocele 112
Ovarian Hydrocele (Dr. Walter's specimen) 113
The Ovarian Sac or Recess on the posterior aspect of the Broad Ligament (human) 114
Transverse section of the Ovary and Ovarian Sac of a Mouse . 115
Ovarian Sac of a Baboon 116
Ovarian Sac of a Porcupine 117
Ovarian Hydrocele from a Mare 118
Ovarian Hydroceles in a Guinea-pig 119
Ovarian Hydrocele 120
Ovarian Dermoid and Pyosalpinx 125
Small adherent Ovarian Cyst 126
Portion of the wall of an Ovarian Cyst, with shaggy Adhesions 132
Ovarian Cyst which had become detached from its uterine connections, probably by torsion 141
Oöphoritic Cyst with a perforated Septum between its two Loculi 149
Hydatid Cyst in the Pelvis 187
Kidney occupying the hollow of the Sacrum 191
Myoma of the Broad Ligaments 207
Broad Ligament Myoma 208
Sagittal Section of the parts involved in the so-called Anterior Perimetritis 212
Fallopian Tube with an Accessory Ostium 226
Pedunculated Accessory Fimbriæ 228
Two Accessory Ostia on one Fallopian Tube 228
Pedunculated Cyst from the Parovarium, lying athwart the Tube 228
Simple forms of Glands 230
Transverse Section of the Fallopian Tube of a Macaque Monkey 231

PAGE

Recess of the Tubal Mucous Membrane of the Panolian Deer (*Cervus eldi*) 232
Transverse Section of the Fallopian Tube of a Woman . . 233
Section of a Uterus from which a Gangrenous Myoma had been removed 237
Salpingitic closure of the Ostium 239
Salpingitic closure of the Ostium 239
Salpingitic closure of the Ostium 239
Transverse section of an Inflamed Tube and Mesosalpinx . 240
Aggressive Cells from the Mucous Membrane of a chronically inflamed Fallopian Tube 243
Large Pyosalpinx 245
Two Legume-shaped Cysts supposed to be Fallopian Tubes . 246
Uterus of a Ewe distended with Mucus: Hydrometra . . 247
The two supposed Fallopian Tubes restored to their probable natural relationship 248
Tubo-Ovarian Abscess, secondary to Gonorrhœa . . . 251
Tubo-Ovarian Abscess 252
Hydrosalpinx 254
Uterus of a Harridan 255
Hydrosalpinx with twisted Pedicle 257
Hydrosalpinx 260
Pedunculated Adenomata of the Cervical Canal . . . 266
Cervix uteri of a Macaque Monkey, with Adenoma . . . 268
Sagittal Section of the Cervix uteri of a Macaque Monkey affected with Adenoma 269
Tubercular Abscess of the Ovary 277
Adenoma of the Fallopian Tube 281
Microscopical Characters of a Fallopian Adenoma . . . 282
Adenoma of the Fallopian Tube (Dr. Walter's case) . . 283
Fallopian Tube strangulated by an adhesion between the Ovary and Intestine 285
Gravid Fallopian Tube at the sixth week 313
Gravid Fallopian Tube at the tenth week, showing complete occlusion of the Ostium 313
Left Fallopian Tube and adjacent portion of the Uterus (Tube occupied by Tubal Mole) 318

PAGE
Apoplectic Ovum, or Tubal Mole 319
Microscopical appearances of Chorionic Villi in transverse section 320
Gravid Fallopian Tube (after tubal abortion) 329
Ovarian Hydrocele 331
Transverse section of the Pelvis of a Woman with an Embryo and Placenta of the fourth month of gestation occupying the right Broad Ligament. 338
Sagittal section of a Cadaver, with a Broad Ligament Pregnancy at term 339
Tubo-uterine Pregnancy 349
Tubo-uterine Pregnancy; the Gestation Sac ruptured at the month 351
Bicornuate Uterus (*uterus Bicornis unicollis*) three days after delivery, to show enlargement of both cornua when one half is gravid 356
Pregnancy in a Rudimentary Uterine Cornu 358
Lithopædion 373
Mass of Fœtal bones, from a case of extra-uterine Pregnancy . 377
Another view of the same group of bones 379
Uterus of an Ewe 382
Incomplete Delivery in a Monkey, due to abnormal size of the Fœtus 384
Mummified Calf retained in the Uterus eighteen months . . 385
Head and one of the Feet of a Lamb retained in the Uterus . 386
Intra-uterine Maceration of a retained Lamb 388
Uterus of a Jackal which ruptured at the junction of vagina and cervix 393
Gravid Fallopian Tube which ruptured and caused death in twelve hours 404
Gravid Tube. The gestation sac ruptured and caused death in about forty-eight hours 407
Gravid Fallopian Tube which has ruptured 409
Head of a Doe (*Capreolus capræa*) with Antlers . . . 478

SURGICAL DISEASES

OF THE

OVARIES AND FALLOPIAN TUBES,

Including Tubal Pregnancy.

Part X.

DISEASES OF THE OVARIES.

CHAPTER I.

SEX; THE GENITAL GLAND OF THE FEMALE; SECONDARY SEXUAL CHARACTERS; MENSTRUATION.

Sex is a term used to express the characters by which an animal or plant is male or female. These characters form two groups. *Primary sexual characters* are those directly associated with the essential function of reproduction, and comprise in the human female the ovaries, Fallopian tubes, and uterus. To these must be added the mammary glands. The dominant sexual organs in the female are the *genital glands*, or *ovaries*. In size the ovaries vary much, and it is unusual to find both of equal size. In outline a mature ovary is oval, but compressed in its long axis, which measures from 3 to 5 cm.; transversely it measures from 2 to 3 cm., and is about 12 mm. in thickness (Fig. 1).

The smoothness of its surface is interrupted by prominences caused by ripening follicles, and by scars which indicate the spots where follicles have ruptured (Figs. 2 and 3).

Towards the close of sexual life the ovaries become

smaller, and the shrinking of the stroma causes wrinkling of the capsule. The external covering of the ovary is directly continuous with the posterior layer of the broad ligament. Its outer covering is called the albuginea.

On microscopic examination the ovary will be found to consist of two distinct parts. That portion forming

Fig. 1.—Ovary of a Woman 23 years old, with the Fallopian Tube in position. Natural size.

its free border is the **oöphoron**; it is the egg-bearing segment, and is full of follicles in various stages of development, maturation, and decay. The ripe follicles are easily recognised by their size, and the recently ruptured follicles usually present themselves as *corpora lutea*, so called in consequence of the peculiar yellow colour of the tissue of which they are mainly composed.

The portion in relation with the hilum is the

paroophoron; it never contains follicles, and is usually composed of fibrous tissue traversed by numerous blood-vessels. In young ovaries the paroöphoron may present remnants of gland tubules, vestiges of the *mesonephros* (Wolffian body) from which it is mainly derived. The excretory tubules and ducts of that interesting structure are invariably attached to the ovary and known as the **parovarium.** The ova after their escape from the

Fig. 2.—Ovary from a Woman 40 years of age. Natural size.

ovary fall into the peritoneal cavity in order to enter the Fallopian tube to be conducted to the uterus.

It is a remarkable fact that the early embryo of all mammals possesses in a potential form the primary sexual organs of both sexes. After a certain period one set of organs predominates and determines the sex. Every fully-formed mature female possesses vestiges of the male sexual organ except the genital gland; and every male has remnants of the female sexual organs, save the ovary.

Secondary sexual characters are those features which enable us to distinguish male and female,

irrespective of the organs of reproduction and those used for the nourishment or protection of the young.

The characters belonging to this group, so far as the human family is concerned, are exclusively in the possession of the male. Man is distinguished from woman not only in the possession of a beard and greater muscular development with its necessary accompaniment, greater physical strength, but he has a more powerful voice, and the skin of his trunk and limbs is thick and more abundantly supplied with coarse hair, which has a somewhat different disposition than in women. In man the front of the chest is usually covered with hair. The hair on the pubes in the male passes upwards to the umbilicus, whereas in the female it is restricted to the pubes. A less constant feature, but one which seems confined to men, is a luxuriant growth of hair on the prominence of the pinna known as the tragus.

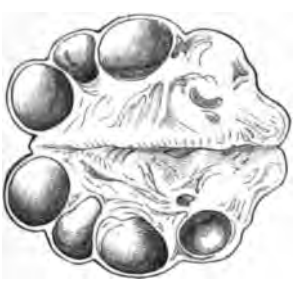

Fig. 3.—Section of Ovary showing ripening Follicles. Natural size.

Secondary sexual characters are not present in the young, but become manifest at **puberty**, by which term we signify *reproductive maturity*. At this period the generative organs increase in size, and in the male become functionally active. In the female puberty is more strikingly declared by the institution of **menstruation.**

It is a remarkable fact that, as Darwin observes, "Throughout the animal kingdom, when sexes differ in external appearance, it is, with rare exceptions, the male which has been the more modified: for, generally, the female retains a closer resemblance to the young of her

own species than to other adult members of the same group." This is well shown in the human family, for up to the period of puberty, so far as secondary sexual characters are concerned, the boy resembles the female as much as he does the male, but after that period he begins to assume secondary sexual characters indicative of the man.

It is well known that if the sexual glands be destroyed, either designedly or by disease, the boy will retain feminine peculiarities. The voice will remain of a childish treble, hair is scanty over the pubes, the skin is soft, and the beard fails to appear. There is a great tendency to an abnormal deposition of fat in the subcutaneous tissues. All these conditions are exhibited in the case of eunuchs.

In children with malformation of the genital organs the secondary sexual characters are not only late in appearing, but are imperfectly developed. In questionable cases of sex the only absolute test is the genital gland. The presence of an ovary is decisive proof of a female, and the testis indicates the male. The other sexual organs are quite secondary, for a uterus has been found associated with testes. The nature of the genital gland cannot be determined by naked-eye appearances, but must be in doubtful cases examined microscopically. On several occasions bodies suspected to be ovaries have turned out to be testes when submitted to this test. No case has yet been recorded in the human family of a functional ovary co-existing with a functional testis, or the combined condition, so common in frogs, known as an ovo-testis.

Menstruation is a process peculiar to the female, and as interference with menstruation is a very important feature in ovarian and tubal disease, it is necessary to consider the chief points connected with this extraordinary phenomenon, and its aberrations, early in

this volume. In the British Isles the average age at which menstruation begins is the fourteenth year, and it continues till the forty-fifth year. It consists in the escape from the vagina of a bloody fluid, resembling prune juice in colour, acid in reaction, and non-coagulable. Microscopically examined, menstrual fluid consists of blood corpuscles and epithelial cells. The epithelium is furnished by the mucous membrane of the uterus and vagina. The actual source of the blood is the mucous membrane of the uterine cavity. The flux lasts on an average five days, and the quantity is about six ounces. The normal menstrual rhythm is twenty-eight days, counting from the beginning of one period to the beginning of another.

Concerning the cause, significance, and utility of menstruation we know nothing, and there is even much diversity of opinion regarding the changes in the uterus at the menstrual period.

It is believed by many that menstruation is accompanied by gross changes in the uterine mucous membrane. Pouchet * maintained that an exfoliation of the epithelium of the uterus occurred monthly in women and mammalia generally, and that there was also destruction and expulsion of the mucous membrane.

Dr. John Williams † has forcibly urged a similar opinion in regard to women. His observations led him to believe that at each menstrual period the epithelium and subjacent parts of the mucous membrane lining the uterine cavity are shed, the denudation commencing at the internal os, and extending to the fundus; the lost tissues being regenerated in the inter-menstrual period.

* Farre's article "Uterus:" Todd's *Cyclopædia*, vol. v.; *Supplement*, p. 666.

† *Obst. Journal*, vol. ii.; 1875.

From this extreme view many observers have dissented. Some believe that only the most superficial parts of the mucous membrane are detached, whilst others state that it remains intact; not even the ciliated epithelium being lost. Opinions were so contradictory on this subject that there seemed little chance of reconciling them. A study of the mucous membrane of uteri obtained from young women dying during menstruation induced me to believe that the loss of tissue described by many writers is the result of *post mortem* change, due to the almost insuperable difficulties of obtaining the parts before they lost their tissue-life. It occurred to me, therefore, to examine the conditions of the mucous membrane of the Fallopian tubes of women during menstruation, and also to investigate the uterine and tubal mucous membrane of Macaque monkeys during that period.

As far as my observations have extended, the only mammals which menstruate besides women are Macaque monkeys and baboons. In Macaques, menstruation is accompanied by certain unmistakable objective phenomena other than the escape of blood from the genital passage, for all the naked or pale-coloured parts of the body, such as the face, neck, and ischial regions, assume a lively pink colour; in some cases it is a vivid red. The amount of sanguineous discharge from the uterus is very slight, and soon ceases, but the coincident coloration of the parts lasts from three to seven days. In warm weather, during menstruation, the labia are much swollen. The baboons present similar objective signs to the Macaques, but in an exaggerated degree, so that a menstruating baboon is anything but a comely individual. After witnessing these outward signs of menstruation in many Macaques and baboons, and ascertaining beyond all doubt that there was an actual flux of blood at these

periods, some of them were killed when the catamenia appeared: some at the full height, and others at its decline. In most cases the uterus was removed and placed in conservative media (Müller's fluid gave best results) the instant death occurred. This enabled me to obtain some beautiful and reliable specimens. In none of them could any trace of destructive change be detected either in the uterus or Fallopian tubes—not even shedding of the epithelium.

The uterus of a Macaque monkey is very instructive for this purpose. In shape, and even in the structure of the mucous membrane and disposition of glands, it is so very similar to that of our own species that it may be described as a miniature human uterus. The glands and their ducts are lined with columnar ciliated epithelium.

My observations threw no light whatever on the source or cause of the hæmorrhage.

The uteri of baboons gave similar results when the same precautions were observed in obtaining and preserving the specimens. The uterine glands in the baboon differ in shape from those of the Macaque. Instead of long tubular glands, they are crypts in the mucous membrane, recalling in a striking manner the Lieberkühnian recesses of the intestine. The uterine glands of the baboon often present shallow diverticula at their bases; the glands are so closely packed together that the mucous membrane, when seen in section, has a villous appearance. The epithelium is columnar and ciliated.

The Fallopian tubes of the Macaques were especially subjected to microscopic examination, and, like the uterus, showed no evidence of epithelial change (Fig. 4).

This induced me to examine microscopically Fallopian tubes from the human female during menstruation. This seems to have been neglected by previous writers

on the subject. The Fallopian tubes examined were obtained by operation performed for ovarian tumours or to produce an artificial menopause in women suffering from uterine myomata. The tubes specially investigated

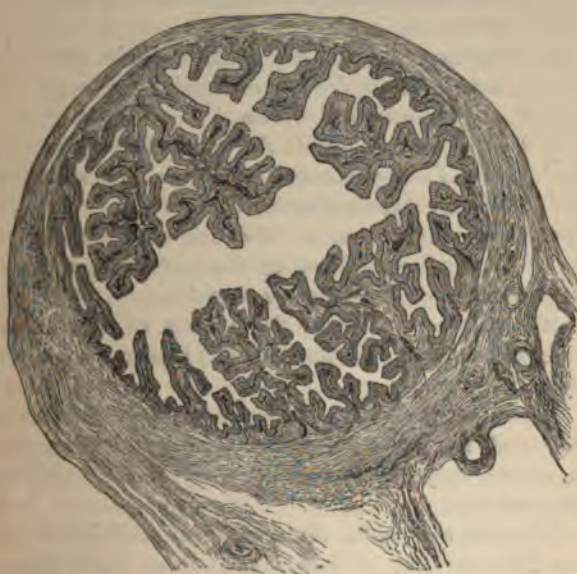

Fig. 4.— Microscopical Appearances of a transverse Section of the Fallopian Tube of a Macaque Monkey (*Macacus rhesus*) during Menstruation.

were those removed during menstruation, and immediately after their abstraction were put into preservative media. None of the specimens showed any change in the mucous membrane or epithelium.

My observations were communicated to the British Gynæcological Society in 1886. The inquiry has been continued at intervals since that date as leisure and

opportunity allowed, and the conclusions arrived at are simple.

1. Macaque monkeys and baboons suffer a periodical loss of blood from the uterus.
2. It is unaccompanied by any destructive change of epithelium, either in the uterus or Fallopian tubes.
3. It appears to recur once in six weeks in summer; it is, however, difficult to decide the exact length of the menstrual rhythm.
4. In the human female the mucous membrane of the Fallopian tube undergoes no structural change during menstruation.
5. In the human uterus the destructive change is limited to shedding of the epithelium, and it is doubtful if this occurs normally.

We must now consider the relation of **ovulation** to menstruation, and the phenomenon known as **œstrus,** or rut.

Many—we may say the majority—think that menstruation and rut are more or less identical. Farre puts the matter very clearly and concisely in the following sentences:—

"In the mammalia the periods of emission of ova from the ovary and of their passage down the Fallopian tube are undoubtedly coincident with œstrus. It is only on these occasions that the female manifests an instinctive desire for copulation. She is then said to be in heat. The vulva is congested, swollen, and bedewed with an increased secretion, which is generally odorous, and is sometimes tinged with blood. This condition is of brief duration. At the longest it continues for a few days. But whatever be its duration, it is the only period during which the female can be impregnated."

"In the human subject the periodical return of

congestion of the reproductive organs, the menstrual flow, and the corresponding emission of ova, so far as this point has yet been ascertained by *post mortem* examination, accord with the phenomena displayed by mammalia during œstrus. It is also believed that in some instances conception has taken place *during* menstruation: a circumstance which is clearly reconcilable with the anatomical evidences already produced, and is so far in accordance with what normally occurs in the mammalia during œstruation. But here the analogy ceases."

Since Farre penned those sentences our knowledge of the natural history of the human ovary has been rendered more certain by exact observations on this gland, which have been possible in consequence of the advance in abdominal surgery. It is very difficult to uproot a tradition, especially one so ancient as the belief in the intimate association of ovulation and menstruation; but evidence is rapidly accumulating which will show that the two processes are not so intimately connected as was formerly believed. It is important that we should consider ovulation in the light of these observations, as it tends to widen the difference between menstruation and rut, which Farre believed to be somewhat analogous, but not identical.

In the ovary of the human fœtus, ova ripen, form follicles, and undergo suppression during the last month of intra-uterine life. This has been observed by De Sinéty, Waldeyer, Begel, and others. I have also assured myself of these facts, and have also detected a similar process in the ovaries of fœtal mammals, including forms as widely separate as kangaroos and lemurs, deer and monkeys, sloths and lions.

The life of the human ovary may be divided into the following periods of activity and repose. The first period

extends from the seventh month of intra-uterine life to the end of the first year. Ova ripen in such abundance that in some cases a marked diminution in the number of the ova is appreciable at the second year after birth. To this succeeds a period of comparative repose terminating at the tenth or twelfth year, then the ripening of ova is again easily detected, and goes on independently of menstruation, even after the accession of the climacteric.

In female monkeys and women ovulation and menstruation appear to be independent processes. Maturation of ova from the period of puberty until senility is going on constantly, and the presence of a ripe ovum concurrently with menstruation is a coincidence; in a healthy woman a ripe follicle may generally be found in the ovary between the tenth and fiftieth year, independently of a menstrual period. Thus menstruation may be defined as a periodical monthly discharge of blood from the uterus.

The œstrus, rut, or heat of mammals is a term applied to certain objective signs that the female will receive the male, and is usually associated with ovulation.

Ovulation signifies the escape of mature ova from the ovary.

Although these three processes may occur independently of each other, still we cannot but doubt that they are physiologically associated; and it is a fact beyond dispute that if the ovaries and Fallopian tubes be removed from a woman who has menstruated with the greatest regularity for years and is still in the bloom of sexual life, we may predict with almost absolute certainty that menstruation will cease.

The removal of the ovaries and tubes, with the adjacent portions of the mesometrium, has now been performed in women for diseases of the ovaries or tubes

many hundreds of times, with the almost invariable result of immediately and permanently arresting menstruation. In many cases, as we shall find later, these parts are removed in some forms of uterine tumour for the purpose of producing an artificial menopause. Lawson Tait * is disposed to believe that the tubes are not without some influence on menstruation. Instances in which the ovaries have been removed and the tubes allowed to remain, or cases in which the tubes were removed and the ovaries left behind, are very few ; but sufficient cases have been recorded to render it absolutely certain that the dominant organs of the menstrual function are the ovaries. It is necessary to use the plural, because extirpation of one ovary exercises no influence on menstruation. In a few cases it is believed that menstruation has continued or reappeared even after complete removal of both ovaries and tubes. This subject is of so much interest and importance that a full discussion of the evidence relating to it will be deferred to chapter xlii. This much, however, is certain : that the subjoined opinion expressed by Farre in 1859 relative to the influence of the ovaries on menstruation—"Their artificial removal is followed by a permanent cessation of the catamenial flow, although the uterus may be left uninjured ; while the congenital absence of both ovaries is always accompanied by an enduring amenorrhœa"—holds good in the present day.

* *Diseases of the Ovaries*, p. 25 ; 1883.

CHAPTER II.

CYSTIC CORPORA LUTEA; APOPLEXY OF THE OVARY; OVARIAN CONCRETIONS.

The corpus luteum.—When the contents of a mature follicle are discharged, the cavity of the follicle, at first filled with blood, becomes gradually occupied by reddish-yellow tissue, which assumes an irregular shape and forms a body termed the *corpus luteum*. Should the ovum become fecundated, the corpus luteum increases in size, and persists as a conspicuous object in the ovary throughout the whole period of gestation.

In an unimpregnated female the corpus luteum begins to degenerate within ten or fourteen days after the escape of the ovum, and finally disappears.

No satisfactory explanation is forthcoming regarding the cause of a corpus luteum. Dr. Ritchie (the elder) pointed out that the mere rupture of an ovarian follicle is insufficient to produce a corpus luteum, and he attempted to show that its formation depended on menstruation. This is not the case, as corpora lutea occur independently of this process in the ovaries of infants and non-pubic girls.

It should be borne in mind that a corpus luteum is not always present in pregnancy. To put it in the words of Parry,* "Its presence is the rule, its absence is the exception, especially in the early months of gestation."

Dr. Popow† has recorded two cases in which he has

* *Ectopic Pregnancy.*

† *Trans. Obstet. Soc., London*, vol. xxiv. p. 100.

found true corpora lutea unassociated with pregnancy. In the ovary of a prostitute, twenty-one years of age, who committed suicide by prussic acid, he found "a fully ripe corpus luteum." The woman was neither menstruating nor pregnant.

The second case was a woman forty-one years of age, who had not borne children for twelve years. She died from gangrene of a fibro-myoma of the cervical canal. The right ovary contained a true corpus luteum.

Matthews Duncan, in his remarks on this paper, said: "He has seen a good corpus luteum, as far as naked-eye appearances went, in an aged woman, who was believed to be salacious. He had more than once dissected cases of pregnancy, with complete absence of the corpus luteum."

The two largest corpora lutea that have come under my observation were in ovaries removed for the purpose of anticipating the menopause in cases of rapidly-growing uterine myomata. The patients' ages were forty and forty-five years respectively. One had never been pregnant, and the other had had no child for ten years.

Cystic corpora lutea.—Rokitansky long ago observed that these bodies are occasionally occupied by a central cavity; and he held the opinion that they might enlarge, and form tumours of sufficient size to become clinically important.

Most observers who have worked at ovarian pathology have detected examples of this form of cyst; the peculiar yellow colour of their walls enables them to be readily recognised.

I have devoted much time to examining ovaries in the human subject, for the express purpose of ascertaining if cysts in corpora lutea ever give rise to tumours which could be perceived during life; and though I have on several occasions met with such cysts, which formed

prominences on the surface of an ovary as large as ripe cherries, they never caused any inconvenience to the individual who possessed them.

In domestic mammals—the cow, ewe, mare, and sow—they are extremely common; in the cow they may attain the size of a Tangerine orange.

In all cases the walls of such cysts are thick, and of a bright yellow colour, when fresh; the cavity is lined by a thin delicate membrane, and filled with albuminous fluid.

Corpora fibrosa.—Patenko* has described, under this term, the tough, semi-opaque fibrous bodies occasionally found in ovaries. They are probably due to fibrous changes in the tissue of the corpus luteum. Some corpora fibrosa contain a small central cavity, others a laminated body, possibly due to colloid change of the central parts of the corpus luteum.

Patenko states that corpora fibrosa may attain the size of a hen's egg. Sometimes these fibrous bodies are pedunculated.

Apoplexy of the ovary.—The rupture of a mature ovarian follicle is always accompanied by a trifling amount of bleeding. When the follicle is unusually large, the blood-clot occupying it may be as big as a ripe gooseberry. Hæmorrhage, to this extent, is often associated with severe ovarian congestion, such as accompanies tubal pregnancy, miscarriage, or uterine tumour.

Mild hæmorrhage of this character is, by some authors, called ovarian apoplexy, but it would be preferable to describe such a condition as *follicular hæmorrhage*, in order to avoid confounding it with the much more

* Virchow's *Archiv*, vol. xxxiv. p. 193: "Ueber die Entwicklung der Corpora fibrosa in Ovarien."

serious form of ovarian hæmorrhage now to be considered.

Winckel states that he has three times seen follicular hæmorrhages in women who have died after burns from petroleum. One of the patients was a servant girl, seventeen years of age. The ovary was 3·5 cm. long, 2 cm. broad, and 1·8 cm. thick, and contained fifteen follicles filled with blood, varying in size from the head of a pin to that of a pea. He has also met with it twice after phosphorus poisoning, and three times after typhoid fever.

Follicular hæmorrhages are not infrequent in the course of acute fevers.

Occasionally blood is extravasated so freely into a follicle that it bursts the walls and invades the stroma, converting the organ into a cyst the walls of which are formed of expanded ovarian tissue, and the cavity filled with blood.

For such conditions the term ovarian apoplexy should be reserved, and which, with Doran,* may be defined as *hæmorrhage into the ovarian stroma through rupture of a follicle* (Fig. 5).

The effects depend upon the amount of hæmorrhage. The ovary may become distended until it is as large as a billiard-ball; such cases are very rare. Dr. Handfield Jones† removed an ovary the size of an orange from a woman who suffered from profuse and exhausting menorrhagia. The hæmorrhage, which had started a year previously, after a serious railway injury, had reduced the patient to a condition of profound anæmia and debility. The loculi of the diseased ovary were filled with liquid blood in varying stages of decomposition.

* *Trans. Obstet. Soc., London*, vol. xxxii. p. 119. This valuable paper is founded on a case of great clinical interest.

† *Ibid.*, vol. xxxiii. p. 27.

After the operation the patient had rapidly improved, and no further hæmorrhage had been reported. More

Fig. 5.—Apoplexy of the Ovary. (Modified from Doran.) (*Trans. Obstet. Soc.*)
P, A fimbriated Kobelt's tube; X, crumpled remains of the wall of the follicle whence the hæmorrhage proceeded.

rarely the ovary may rupture, and the blood, escaping into the recto-vaginal pouch, forms what is usually called a pelvic hæmatocele. Some writers even go so far as to

believe that when apoplexy of the ovary causes rupture of the organ the hæmorrhage may be fatal. A critical examination of the published cases leads me to suspect that in many reported examples of this accident the fatal bleeding was caused by rupture of a gravid tube or tubal abortion.

I once reported a case of pelvic hæmatocele as being due to bursting of an enlarged ovarian follicle. Fortunately, the parts were preserved. Several years later I re-examined the specimen, and found the hæmorrhage was caused by rupture of a gravid tube; the ovum was detected among the blood-clot.

Enlarged ovarian follicles distended with blood are so frequently associated with tubal gestation that recorded cases of rupture of the ovary leading to severe or fatal hæmorrhage must be accepted with the utmost caution. At present I cannot refer to a reliable instance in which ovarian apoplexy has caused death, or even imperilled life. Blood extravasated into the ovarian stroma undergoes the same change as when it escapes into other solid organs: that is, the fluid parts are absorbed and the clot gradually becomes decolorised, until nothing but a yellowish mass of fibrin remains. Occasionally it will be of a dirty brown colour, resembling that found in an old hæmatocele of the tunica vaginalis testis.

Ovarian concretions.—The only instance of concretions occurring in the ovary is recorded by Dr. H. W. G. Mackenzie.* The patient was forty-one years of age, and had suffered for two years from menorrhagia, she had a large myoma of the uterus. The ovaries were enlarged, and contained a number of black, hard, flat bodies. The cavities containing them were smooth-walled. The concretions were of various sizes, from a

* *Trans. Path. Soc., London*, vol. xl. p. 198.

coriander-seed to a small bean, and of irregular shape, but their surfaces were smooth and flattened where they had come in contact with one another. They were firm and hard, but light, and could be cut with a knife like very hard wax.

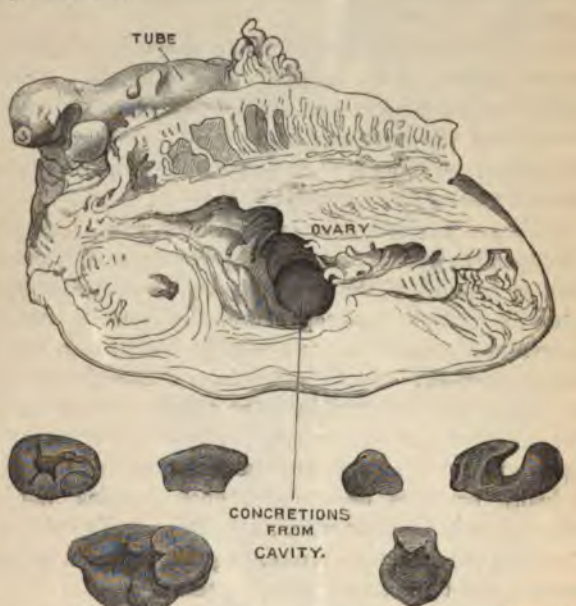

Fig. 6.—Ovary with Cysts containing Concretions (Museum, St. Thomas's Hospital.)

Under the microscope, sections prepared from the concretions exhibited no structure, but there were indications that the mass consisted of spheroidal bodies.

Dr. Copeman attempted to determine their chemical constitution. They were insoluble in acid and alkaline solutions, and in ether and chloroform. Prolonged digestion with artificial gastric juice in an incubator at

the body temperature dissolved them. The coloured solution thus obtained gave the spectrum of acid hæmatin and the guaiacum reaction for blood.

The concretions probably consisted of coagulated proteids derived from blood-clot, akin to lardacein, and of the same family as the concretions of the prostate and the amyloid bodies sometimes found in old hæmorrhages.

It is probable that the cavities which contained the concretions were ovarian follicles, and that blood had been effused into them and undergone a rare colloid change.

It is not unusual to find hard clots of blood in ovarian follicles, but concretions of the density exhibited in this specimen are excessively rare.

CHAPTER III.

MALFORMATIONS, MISPLACEMENT, AND ATROPHY OF THE OVARIES.

THE ovaries, like other organs of the body, are liable to malformations and misplacements, some of which possess a practical interest.

Congenital absence of both ovaries is very rare, and is always associated with defective development of the uterus. Absence of one ovary has been several times recorded, with deficiency of the corresponding half of the uterus and the Fallopian tube. In a fair proportion of cases there is absence of the corresponding kidney.

A third or accessory ovary has been mentioned by a few writers. Several conditions have been described as third ovaries. The most frequent is when an ovary is traversed by a deep fissure, so as to almost isolate a portion of the gland. Under such conditions the ovary seems to consist of two parts, united by a narrow isthmus. It is stated that the ovary may be so deeply fissured that it appears as if composed of lobules. Olshausen* has collected many reported cases of supernumerary ovaries, and refers to those described by Beigel and Winckel. I have examined the drawings in Winckel's work, and find that he gives figures of ovaries with small pedunculated bodies attached to them; but these are not in any sense supernumerary ovaries. Indeed, the statement that Winckel found accessory ovaries eighteen times in 500 bodies, and that Beigel found them eight times in 350 female

* *Krankheiten der Ovarien*, p. 15; 1886.

bodies, is sufficient to indicate that these writers must have regarded any pedunculated body near the ovary as an additional ovary. The descriptions of some of the cases render it exceedingly probable that some of them were the pedunculated bodies so frequently found near, and in relation with, the parovarium. A few were probably corpora fibrosa. So far as the evidence at present stands, an accessory ovary quite separate from the main gland, so as to form a distinct organ, has yet to be described by a competent observer.

Doran,* in an interesting specimen exhibited at the Pathological Society, showed that small fibro-myomata may arise in the ovarian ligament. The specimen consisted of the left ovary with its ligament. In the midst of the substance of the ovarian ligament there was a small spherical tumour about 12 mm. in diameter. The tumour was composed of plain muscle fibres, mingled with white fibrous tissue. When the parts first came to light during the operation, it appeared to be a supernumerary ovary, but microscopically it was found to be a fibro-myoma. In concluding his account of the case Doran writes:—"My experience in this case leads me to believe that others may have mistaken a fibro-myoma of the ovarian ligament for a supernumerary ovary." It is a very remarkable circumstance that the opposite ovary of this patient presented a small lobe, such as is termed a supernumerary ovary.

Congenital misplacements of the ovaries are very rare. In the early embryo they are situated, like the testicles, in close relation with the kidneys. In the majority of vertebrates they maintain this position throughout life. In a few of the higher mammals, including the human female, they migrate into the pelvis, and at birth they lie

* *Trans. Path. Soc., London*, vol. xxxviii. p. 245.

on the psoas magnus muscle. Soon after birth the ovaries occupy a position in the true pelvis, near its brim, until disturbed by the first pregnancy, or by disease.

In very rare instances an ovary may be retained in relation with the kidney. An example of this came under my observation in a fœtus. The genital organs were well developed, but the right ovary was adherent to the lower border of the corresponding kidney ; the cæcum remained in the right hypochondrium, adherent to the under surface of the liver.

It is well known that in a certain proportion of cases of non-descent of the right testis, the cæcum also fails to descend into its natural position in the right iliac fossa. It is of some interest to find retention of the right ovary in the loin associated with the same disposition of the cæcum.

This is the only example of non-descent of the ovary which has come under my observation : the fœtus was born at full time, but had spina bifida.

Hernia of the ovary.—Many cases have been recorded in which a body supposed to be an ovary has been found in the inguinal canal. It is curious, notwithstanding the fact that inguinal hernia is extremely common in infants, no authentic case can be cited in which an ovary has been found in a hernial sac at birth. Cases reported as congenital hernia of the ovary may be found, the nature of the gland being determined by the naked eye ; there is no example on record in which the structure of such a body was examined microscopically, and found to be an ovary.

That this precaution is absolutely necessary to establish the fact is shown by cases in which herniated bodies, supposed to be ovaries, were found on microscopical examination to be testes.

One of the most remarkable examples was recorded

by Dr. Chambers.* An individual, supposed to be a woman, aged twenty-four years, had observed swellings in the groin as long as she could remember. She had never menstruated; her breasts were well developed, but nippleless. The mons veneris was destitute of hair, the clitoris and labia were small, and the vagina ended in a cul-de-sac an inch deep. As the inguinal swellings caused the patient much inconvenience and pain, they were removed. They were shown to the Obstetrical Society, London, as ovaries. They were subsequently examined by Drs. J. Williams and Galabin, who reported that the supposed ovaries exhibited the microscopical characters of testicles.

It is also important to bear in mind that when organs supposed to be ovaries occupy the inguinal canal, and subsequent dissection of the individual discloses the existence of a uterus, it is no reason for assuming that the genital glands were ovaries.

Whilst dissecting the body of a male fœtus, born at the eighth month, I found a uterus of the normal size and shape behind the bladder, and communicating by means of a small vagina with the urethra in the situation of the sinus pocularis. The Fallopian tubes passed from the uterus as mere threads until they approached the inguinal canals, then each expanded to form a fringed ampulla in relation with an oval body of the size of a fœtal testicle lying just below the internal ring. The microscope showed each of these bodies to be testicles. Franck has recorded a similar persistence of the peritoneal extremity of the Fallopian tube in relation with normally formed testicles in a foal.

Stonham† exhibited to the Pathological Society,

* *Trans. Obstet. Soc., London*, vol. xxi. p. 256.
† *Trans. Path. Soc., London*, vol. xxxix. p. 219.

London, the genital organs of a child in which a uterus and Fallopian tubes were associated with testes.

The child when born had a right congenital inguinal

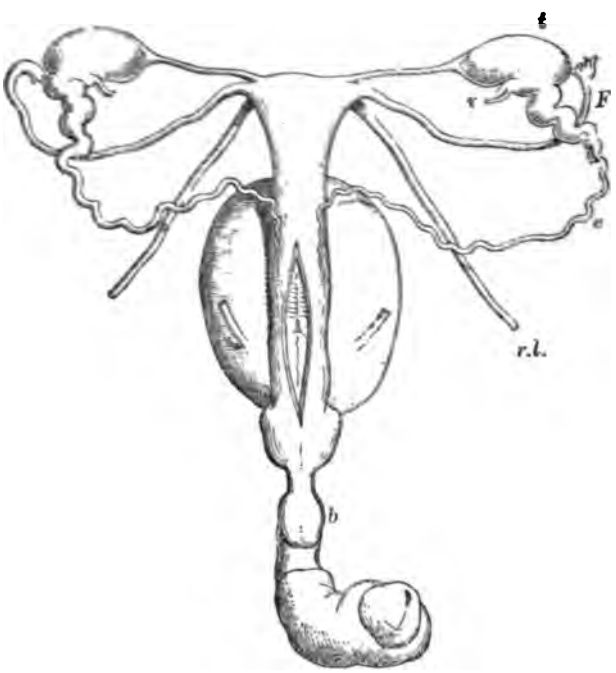

Fig. 7.—Genital Organs of a Pseudo-hermaphrodite. (After Stonham.)
Vas deferens; *t*, testes; F, Fallopian tube; *b*, bulb; *v* vessels; *r*, *l*, round ligament.

hernia. When nine months old an attempt was made by Mr. Horsley to cure the hernia by operation. When the sac was opened, an organ supposed to be the uterus with Fallopian tubes, and bodies regarded as ovaries, were found. The child died from the operation, and Stonham made a careful dissection of the parts, and

illustrated his paper by a drawing, reproduced in Fig. 7. The bodies which occupied the inguinal canals were examined microscopically, and found to be testes. If it were necessary, several similar cases could be quoted.

Mr. Langton* has published a paper of much clinical interest on "Hernia of the Ovary," founded on personal observation at the City of London Truss Society.

In eight years he saw 589 cases of inguinal hernia in female children, which he classes as *congenital*, because they were "for the first time discovered either at birth or within the first year." This is, of course, far too wide an extension of the true meaning of the word congenital. Among these 589 cases there were forty-three instances in which movable bodies could be distinguished in the canal. These movable bodies were oval, hard, somewhat flattened, with their long axes in the direction of Poupart's ligament, and of about the size of a testis of a boy of corresponding age. Of the forty-three cases, twenty-nine were reducible and fourteen were irreducible; in seven cases a movable body was present on each side. In only one instance was the diagnosis verified by dissection: "In this child the protrusion was ascertained to be the ovary of the right side, together with its own Fallopian tube." There is no evidence that the ovarian nature of this gland was demonstrated microscopically.

It is also important to remember that in none of these cases was there malformation of the external genital organs.

Interesting as these facts are in certain directions, they cannot be accepted unreservedly as cases of ovarian hernia, for the following reasons:—

* *St. Bartholomew's Hospital Reports*, vol. xviii. p. 199.

i. In all cases of supposed congenital hernia of the ovary the nature of the gland must be substantiated by microscopical examination.

ii. The association of a Fallopian tube, or the supposed or real existence of the uterus, is no proof that the movable body is an ovary.

iii. The ovary of a child at birth is not rounded like a testis, but is a narrow elongated body, not nearly so large as a testis of corresponding age. (*See* Fig. 8.)

iv. Some of the oval movable bodies were probably small hydroceles.

Thus the inferences in Mr. Langton's useful paper are not sustained by facts, and there is every need to observe his cautious expression:—"A precise diagnosis of these bodies is necessarily somewhat fallible, and can only be conclusively set at rest by subsequent dissection and actual microscopic examination."

I do not deny that an ovary may occupy the inguinal canal at birth, but no such case has, so far as I know, been recorded in which the ovarian nature of the herniated body has been proved by microscopical examination, conducted by a competent observer.

Bilton Pollard* has recorded a case in which he excised an acutely strangulated ovary and a portion of the Fallopian tube from a child three months old.

Acquired hernia of the ovary.—The ovary occasionally occupies the sac of an inguinal hernia, either alone or in company with a knuckle of gut or a piece of omentum.

In 1881, whilst I was dresser to Mr. J. W. Hulke, a woman, aged twenty years, came under observation with a troublesome swelling in the right groin, which had

* *Lancet*, 1889, vol. ii. p. 165.

existed for six weeks. Mr. Hulke explored the swelling, and found it to be an ovary, with the adjacent parts of the Fallopian tube attached to what appeared to be a bicornuate uterus. There was atresia of the vagina. On examining the gland I found it contained two corpora lutea and several follicles, and exhibited the microscopical characters of an ovary The left ovary was removed by Dr. Heywood Smith* four years later.

Dr. Robert Barnes† mentions an instance of acquired hernia of the ovary in a woman forty-one years of age. Its ovarian character was substantiated microscopically by Dr. Goodhart.

It has been stated that in acquired hernia of the ovary the Fallopian tube does not usually accompany it; (Englisch); evidence in support of this statement is very scanty.

Concerning acquired hernia of the ovary, Mr. Langton states that "out of 3,495 cases of inguinal occurring in females of all ages over the first year of life, there were observed only 24 examples, or 1 in 145, as against 1 in 14 congenital cases."

In a case mentioned by Langton in the paper to which reference has been made, "the patient was a remarkably well-developed girl of seventeen years; inguinal swellings, regarded as herniated ovaries, had been noticed since the age of three years. She continued under observation for three years, but had not menstruated." This is significant.

Cases described as hernia of the ovary in adults, based on clinical evidence, are valueless. When removed, either *ante mortem* or *post mortem*, their ovarian nature should be confirmed with the microscope. No

* *Journal of the Brit. Gyn. Soc.*, vol. i. p. 321.
† *Amer. Journal of Obstet.*, vol. xv. p. 11.

more striking instance of the necessity of this could be adduced than the celebrated case recorded by Chambers.

Prolapse of the ovary.—In describing the situation of the normal ovaries, it was pointed out that in the adult female they are situated in the true pelvis, near its brim, until disturbed by the first pregnancy or by disease. From this position they may be displaced by three sets of causes, each of which will be briefly considered.

i. *Pregnancy.*—The alterations in the size of the uterus during pregnancy, and the stretching to which the broad ligaments, Fallopian tubes, and ovarian ligaments are subjected, causes them, especially if the pregnancy is frequently repeated, to become very lax. Under these conditions, one or other ovary, instead of retaining its usual position at the brim of the true pelvis, may drop upon or near the floor of the recto-vaginal pouch. When the left ovary is thus displaced it lies between the upper part of the vagina and the rectum.

An ovary thus displaced is said to be prolapsed, and not infrequently it is a source of much pain and distress, for it becomes pressed upon during defæcation, and patients complain of the severe pain they then experience. Intense pain during sexual congress (dyspareunia), is another symptom, and many patients with displaced ovaries will state that the approach of the husband is to them a source of constant dread. On examining such patients a small rounded body will be felt behind the uterus; usually it is movable, and feels somewhat like a marble lying behind that organ. Each time the finger touches it the patient winces and complains of pain. These painful sensations are most acute when the ovary itself is touched, but they are also evoked when the neck of the uterus is pressed, because the ovary is then squeezed between the uterus and rectum.

ii. *Retroflexion of the uterus.*—When the uterus is

acutely retroflexed the ovaries become displaced and sometimes fixed to the floor of the recto-vaginal pouch by adhesions.

iii. *Enlarged ovaries.*—When an ovary is enlarged, in consequence of a solid or cystic tumour of moderate dimensions, its weight will cause it to fall upon the floor of the recto-vaginal pouch; the presence of a small parovarium cyst will produce a similar displacement.

The clinical bearing of displacements of the ovary

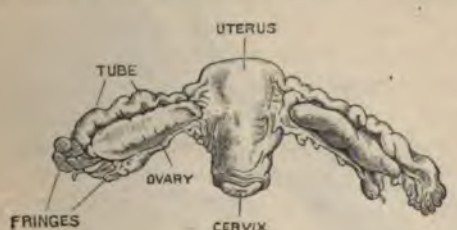

Fig. 8.—Uterus, Tubes, and Ovaries of an Infant one month old. Natural size.

from various causes will require careful discussion in subsequent sections of the book.

Alterations in shape of ovary at different periods of life.—The variations in the shape of the ovary from infancy to old age are very marked. In the fœtus at birth the ovary is an elongated body, resembling in shape a miniature but somewhat flattened cucumber, lying parallel with the Fallopian tube; not infrequently its borders are crenated, and sometimes a longitudinal furrow is present on its free surface. The ovary of an infant a month old is represented of natural size in Fig. 8.

The infantile form of ovary gradually changes, and at puberty it has become transformed into the characteristic olive-shaped gland, indicative of the sexually mature female. From the accession of puberty until the forty-fifth

year the general contour of the ovary remains undisturbed, but the smoothness of the surface is marred by scars, the effects of repeated lacerations, caused by the rupture of mature follicles. In rare instances the infantile shape of the ovary may be retained, especially in the

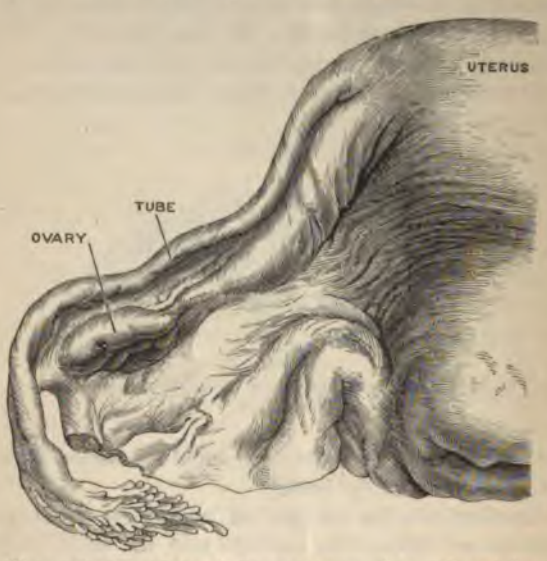

Fig. 9.—Ovary and Tube of a Woman 68 years of age. Natural size.

malformation known as *unicorn uterus*. In this condition —more fully considered subsequently—one-half the uterus, with the tube and ovary, proceeds to full development, but the opposite half remains stunted, or rudimentary. In these specimens the ovary generally retains throughout life its infantile shape.

From the age of forty-five onward the ovary begins to diminish in size. This alteration is accompanied by arrest of menstruation. As the organ shrinks the surface

becomes irregular, and often marked with deep wrinkles. At the same time profound alterations are taking place within the gland, for the ova and ovarian follicles gradually disappear, until, in very advanced life, nothing is left but a corrugated body, consisting of fibrous tissue, traversed by a few blood-vessels (Fig. 9).

The alteration in the size of the organ may be best expressed by giving the difference in weight. The ovary of a healthy woman of twenty years weighs, on an average, 100 grains; in an old woman of seventy years it may weigh only 15 grains.

The uterus and Fallopian tubes undergo a corresponding diminution in size, and the mucous membrane atrophies.

Atrophy of the ovary.—The senile changes just described may be regarded as physiological atrophy; when they occur at an early period in the sexual life of a woman, they are then described as pathological. Our knowledge of premature atrophy of the ovary is not very precise, and reliable accounts of the microscopical appearances of atrophied ovaries are very few.

Doran* described in detail a case of atrophy of the ovaries, associated with deficient development of the uterus and atresia of the external os, in a woman thirty-eight years of age, who became insane a few months before her death.

The uterus preserved its infantile shape; the Fallopian tubes were normal. The right ovary was two inches long and a quarter of an inch wide. The left was an inch and a half long. On microscopic examination no trace of ovarian vesicles could be detected. In shape these ovaries preserved the infantile type.

An example of premature atrophy of the ovaries from

* *Trans. Obstet. Soc., London*, vol. xxi. p. 253.

a woman thirty-nine years of age is represented in Fig. 10. The irregular exterior resembles the convolutions on the surface of an infant's cerebrum.

Ovaries similar to the specimen in Fig. 10 are not infrequently described as cirrhotic, probably because the ultimate effect upon the proper tissue of the ovary is similar to that seen in hepatic, renal, and pulmonary cirrhosis: viz. the overgrowth of fibrous tissue destroys

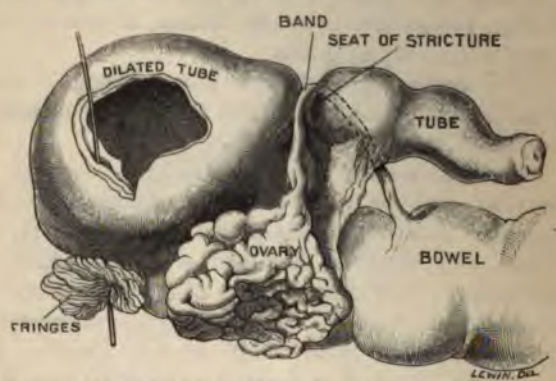

Fig. 10.—Atrophied and Crenate Ovary from a Woman 39 years of age.

the secreting or proper tissue of the liver, kidney, or lung, as the case may be. The great difference in fibrosis of the ovary as compared with this change in other organs is, that in the ovary the thickening of the albuginea and the overgrowth of the connective tissue of the stroma show no evidence of inflammation. In cirrhotic livers the interstitial tissue is infiltrated with small round cells, but in cirrhotic (or fibroid) ovaries this is not the case even when this change occurs in the ovaries of women who also have cirrhotic livers.

The changes described as cirrhosis, or fibrosis of the ovaries, occurring in women between twenty and forty

years of age, require a fuller investigation than they have yet received. Even the causes which produce the change are very imperfectly understood; but the condition is said to follow typhoid fever, the exanthemata, rheumatism, and, Dr. Matthews Duncan suggested, alcoholism.

The results produced by the change are *dysmenorrhœa* and *sterility*.

Atrophy of the ovary is sometimes observed when the organ is compressed by a large parovarian cyst or a myoma of the uterus. The gland is sometimes found flattened and compressed like a leaf. On microscopical examination nothing is seen but fibrous tissue.

Oöphoritis and **perioöphoritis,** acute and chronic, are so constantly associated with salpingitis, and in nearly all cases are secondary to it, that the subject will be treated in the section devoted to diseases of the tubes. There is, however, one form of perioöphoritis which needs mention here. When a woman has suffered from a combination of parametritis and perimetritis, the serous covering of the ovary and Fallopian tube on one or both sides becomes implicated. As the inflammation subsides the ovary and tube, glued together by the adhesive inflammation, become permanently fixed to the posterior aspect of the broad ligament and to each other by dense adhesions. This should be remembered, or the trouble may be erroneously attributed to salpingitis. Such a condition is sometimes denominated *perioöphoritis*.

CHAPTER IV.

THE PELVIC PERITONEUM.

For a correct appreciation during life of the morbid anatomy of the ovaries and Fallopian tubes it is necessary to study in some detail the relation of the peritoneum to the pelvic organs.

The peritoneum as it descends from the posterior wall of the abdomen enters the cavity of the true pelvis, covers the anterior face of the sacrum and the first part of the rectum; it gradually leaves the sides of the second part of the rectum, and passing on the upper half-inch of the posterior wall of the vagina, is prolonged upwards on the posterior surface of the uterus. After covering the fundus, it descends on the anterior face of the uterus and leaves it to cover the posterior surface of the bladder, and ascends on the posterior aspect of the anterior abdominal wall.

The fold formed by the peritoneum, as it is reflected over the uterus and Fallopian tubes, is known as the mesometrium, or broad ligament. Strictly the broad ligament is a continuous fold of peritoneum, but for clinical purposes it has been found convenient to regard it as consisting of two halves—usually referred to as the right and left broad ligaments. These folds are directly continuous laterally with the peritoneum lining the iliac fossæ, and on the right side with the serous covering of the cæcum and its appendix.

The recess in the peritoneum between the uterus and rectum is known as the *recto-vaginal pouch* (pouch of

Douglas), and that between the uterus and bladder the *utero-vesical pouch.*

Of the two pouches, the recto-vaginal is the deeper, and extends lower on the left than the right side.

Champneys* has described a case in which he found a diverticulum, large enough to receive and conceal the first joint of the middle finger, at the bottom of the recto-vaginal pouch : its lowest point being one inch and a half below the level of the external os.

In cases of bicornuate uteri in the human female of the variety *uterus bicornis unicollis*, a median vertical fold of peritoneum divides the recto-vaginal pouch, and continues forward between the uterine cornua on to the posterior aspect of the bladder, thus dividing the utero-vesical pouch into two lateral shallow depressions.

The degree to which the pelvic organs are invested by the peritoneum varies much, and as this has important relations in determining the course of fluid, such as pus and blood, it is necessary to study it. It has already been mentioned that the first part of the rectum is almost completely covered, whilst the second part is only covered on its anterior surface. The uterus is covered behind and in front, whilst its sides are in relation with the narrow connective tissue tract of the mesometrium. The vagina is only immediately in relation with the peritoneum by the upper half-inch of its posterior cul-de-sac. The bladder is covered on that portion of its posterior surface situated above a line drawn across the entrance of the ureters.

The subserous tissue varies in quantity in different situations. Over the sacrum it is very lax, and occasionally one of the kidneys is situated in the hollow of this bone, and the laxity of the tissue will allow of its

* *Trans. Obstet. Soc., London*, vol. xx. p. 124.

free movement up and down or from side to side. In front of the bladder the tissue is very lax, and capable of division into two layers; the space between them is sometimes called the *cave of Retzius*. In the adult a large plexus of veins lies in the vesical wall of this imaginary cave.

Each broad ligament consists of two layers of peritoneum slightly separated by connective tissue and involuntary muscle tissue. Each contains the Fallopian tube, the ovary, parovarium with Gartner's duct, the ligament of the ovary, the ureter, numerous blood-vessels, lymphatics, and nerves. In order to appreciate the pathological relations of the broad ligament, it is necessary to indicate the positions of the various organs contained between its layers. When the parts are stretched out the Fallopian tube will be found to occupy the free border, and to be attached by the tubo-ovarian ligament to one extremity of the ovary. The opposite pole of the ovary is connected by the ligament of the ovary to the side of the uterus. The upper part of the broad ligament is called the *mesosalpinx*, and is included between the Fallopian tube, the tubo-ovarian ligament and the ovary with its proper ligament. It contains between its layers the parovarium and the associated portion of Gartner's duct, the ovarian artery, a plexus of veins, and, passing from its anterior and inner part close to the uterine end of the Fallopian tube, the round ligament of the uterus.

The round ligaments arise from the upper angles of the uterus anterior to the Fallopian tubes; each passes obliquely forward to gain the internal abdominal ring, in order to traverse the inguinal canal. A fold of peritoneum, directly continuous with the anterior layer of the broad ligament, partially invests these muscular cords, and forms a narrow pouch in the inguinal canal, known as the canal of Nuck, generally obliterated in the adult. It

corresponds in situation and mode of formation with the funicular pouch of peritoneum in the male. These peritoneal pouches are formed about the period at which the ovaries descend from their lumbar position, near the kidneys, to their acquired situation, in the pelvis.

Two strands of tissue, the *utero-sacral ligaments*, pass from the sides of the sacrum, as high as the body of the second sacral vertebra, to the lateral aspect of the supra-vaginal portion of the neck of the uterus.* They give rise to the peritoneal folds on each side of the pelvis, which form definite limits to the recto-vaginal pouch.

The portion of the broad ligament below the meso-salpinx contains the ureter, some large veins, the uterine artery as it passes from the iliac trunk to gain the uterus, and the fibrous cord representing the obliterated hypogastric artery. The lower part of the broad ligament differs from the mesosalpinx in that the two layers are more separated from each other, the connective tissue is of looser texture and allows fluid accumulations on one side to pass round the back of the uterus into the opposite half of the broad ligament, and, on the left side, an abundant hæmorrhage, or a fluid effusion, will make its way around the second part of the rectum. When extensive, such effusions will raise up the anterior layer of the broad ligament, and present at the level of Poupart's ligament, especially in the neighbourhood of the inguinal canal; occasionally the fluid will pass round the bladder and invade the connective tissue in the cave of Retzius. The laxity of the subserous tissue near the pelvic brim will allow pus collected around a suppurating

* For a detailed and historical account of the utero-sacral ligaments and the cave of Retzius, consult Delbet, *Des Suppurations Pelviennes chez la Femme;* Paris, 1891.

or sloughing vermiform appendix occasionally to make its way between the layers of the broad ligament; this, however, can only happen when the pus finds its way between the layers of the mesocæcum.

The facility with which the anterior layer of the broad ligament can be stripped up, except when firmly fixed by old inflammatory adhesions, explains the frequency with which pelvic abscess points in the neighbourhood of Poupart's ligament. Large tumours growing from the side of the uterus, or from the connective tissue of the broad ligament, or a fœtus developing between its layers, will in some instances raise up the anterior layer, and insinuate themselves between the peritoneum and the front wall of the abdomen. The fact that the tissue in the mesometrium contains unstriped muscle fibre is of some importance, as it plays a part in several morbid conditions. It is also important to remember that, whereas fat is present and usually abundant in the subserous tissue, it is, as a rule, wanting in the mesometrium. Occasionally, however, fat is found in this situation, and has been known to be so abundant as to form a so-called fatty tumour.

The peculiarity of cysts and tumours in their behaviour to the broad ligament will be more fully discussed afterwards. We must, however, devote here some space to the consideration of the anatomy of the mesosalpinx.

It has already been mentioned that the *Fallopian tube* lies in the free border of the broad ligament, and is invested on two-thirds of its circumference by peritoneum. The muscle tissue of the broad ligament is directly, though loosely, continuous with the muscle tissue of the wall of the tube. That the tube is loosely connected to its peritoneal coat is shown by the fact that it moves to a certain extent independently of its serous investment.

For instance, in the fœtus near the time of birth, and for a year or two afterwards, the Fallopian tubes are very tortuous. This tortuosity, or angulation as it is sometimes called, is due to the tube increasing in length at a greater rate than the mesometrium. When the uterus rises out of the pelvis during pregnancy, the tubes are elongated and hypertrophied; when involution follows delivery at term, and the parts sink to their usual position, the tubes present for a time an irregular twisted appearance. Again, when the tubes inflame, they lengthen, and the increase in length manifests itself in angulation.

The relation of the *ovary* to the mesometrium is very different to that of the Fallopian tube. When the parts are examined from the front aspect the ovary is not seen, whereas on the posterior aspect it is a conspicuous object. This is due to the fact that, whereas the tube is invested by both layers of the mesometrium, the ovary is only covered by the posterior layer.

The *arteries* lying between the layers of the broad ligaments are numerous and important. The largest is the *uterine artery*, which is given off by the anterior division of the internal iliac; it runs under the peritoneum towards the cervix of the uterus, and then turns upwards as soon as it gets between the folds of the broad ligament, and runs for a space by the side of the uterus, nearer the posterior than the anterior surface, and as it approaches the fundus inosculates with the ovarian artery. As the artery ascends it gives off branches to the anterior and posterior surface of the uterus which anastomose with similar branches from the uterine artery of the opposite side.

The *ovarian*, like the spermatic artery in the male, arises from the abdominal aorta below the renal vessels, and runs downwards to pass between the layers of the broad ligament at the brim of the pelvis, then makes its

way to the side of the uterus, near the fundus, to inosculate with the uterine artery. In its course between the folds of the ligament it distributes numerous branches to the ovary. Fallopian tube, fundus of the uterus, connective tissue in the broad ligament, and gives a branch which anastomoses with a small vessel derived from the deep epigastric artery which is conducted along the round ligament.

The *veins* follow much the same course as the arteries to which they belong, but the various branches of the ovarian vein are very large, and when the ovary forms a large cyst, or the uterus is occupied by a myoma, or is gravid, these veins become greatly dilated. The *ovarian veins* are situated mainly in the mesosalpinx, where they give rise to the *pampiniform plexus*, which is homologous with the plexus of the same name in the male, and, like it, represents the persistent veins of the Wolffian body. Near the outer end of each broad ligament the veins coalesce, and a single trunk finally issues to terminate on the right side in the inferior vena cava, and on the left side in the renal vein.

The long course which the ovarian arteries and veins pursue is explained by the fact that in the early embryo the genital glands in each sex lie in the loin, in relation with the kidneys, and originally received their blood supply from the immediately adjacent aorta; as the glands—testes or ovaries—descended into the scrotum, or pelvis, the arteries and veins became elongated.

THE BLADDER AND URETERS IN THE FEMALE.

The bladder is so directly concerned in the differential diagnosis of abdominal tumours and in operative procedures in the pelvis, and is, with the ureters, so often in danger of injury, and not infrequently these structures are actually seriously damaged, that it is necessary

to briefly summarise the chief relations of the parts. This is not difficult, as the anatomy of the bladder and ureters in its surgical bearings has been very carefully investigated. Except when considerably distended, the bladder lies behind the pubes, and does not rise so rapidly out of the pelvis as in the male. When over-distended it forms an oval cyst, situated exactly behind the middle line of the anterior abdominal wall. Sometimes it is drawn upwards, and spread out laterally over the anterior surface of a uterine tumour. As the bladder distends with urine and extends upwards into the abdomen, it displaces the peritoneum and, in some cases in which the bladder is permanently drawn upwards by a tumour, it will lie in front of the peritoneum even when empty, and has, under such conditions, been opened by the knife of an incautious surgeon, unaware of the possibility of this alteration in its position. The eye of the experienced surgeon usually prevents this accident, for the muscular coat of the bladder, when deprived of its serous coat, has a very characteristic appearance.

The *ureters* enter the pelvis near the point of division of the common iliac arteries—sometimes a little posterior, sometimes a little anterior to the point of bifurcation. Each ureter dips down the posterior wall to near the ischial spine: from this point, still descending, they pass forward and inward, lying in the connective tissue at the base of the broad ligament, and pass within half an inch of the neck of the uterus; descending along the side and upper part of the vagina, they turn to the middle line and enter the posterior wall of the bladder. Whilst the ureters are passing from the posterior wall of the pelvis, to gain the side of the neck of the uterus, they are crossed by the uterine artery. In the operation of ovariotomy a ureter may be damaged when the cyst is fixed by firm adhesions near the brim of the pelvis.

CHAPTER V.

OÖPHORITIC CYSTS.

It has already been pointed out that the ovary consists of an egg-bearing portion, the *oöphoron* and a region in which ova are not found, termed the *paroöphoron.* If to these the *parovarium* be added, we can arrange the cysts

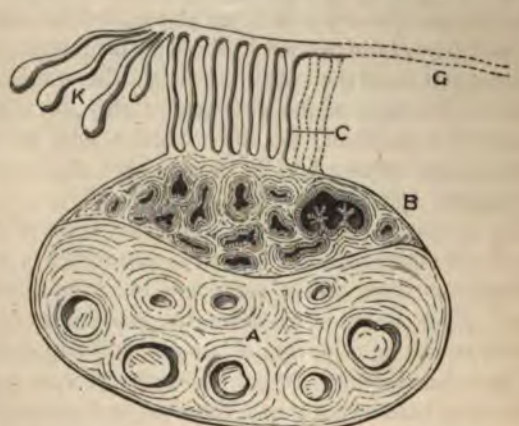

Fig. 11.—Diagram representing the Cyst Regions of the Ovary.
A, Oöphoron; B, paroöpheron; C, parovarium; K, Kobelt's tubes; G, Gartner's duct.

which arise in each region in three classes, for they present distinctive features. The relation of the three cyst regions to each other is diagrammatically shown in Fig. 11.

The cysts peculiar to each region will be considered

under three headings :—(1) Oöphoritic cysts ; (2) Paro-öphoritic cysts ; and (3) Parovarian cysts.

Oöphoritic Cysts.

For clinical convenience cysts of the oöphoron may be studied in two groups :—1. *Unilocular cysts* 2. *Multilocular cysts*

Fig. 12.—A, Incipient Oöphoritic Cyst. B, Paroöphoron. P, Parovarium. F, Fallopian Tube. Natural size.

1. **Unilocular cysts.**—The term unilocular has mainly a clinical significance : it is rare to find an oöphoritic cyst with only one cavity. A careful examination of such specimens will usually reveal numerous smaller loculi in the walls, or imperfect septa and bands of tissue passing from one part of the cavity to another indicate that the cyst was originally compound. Many of the large one-chambered cysts, described by early ovariotomists as ovarian, in many instances originated in the parovarium.

An incipient oöphoritic cyst is shown in Fig. 12. In this specimen it was easy to demonstrate that the cavity was an enlarged ovarian follicle, for its walls were furnished with a well-marked membrana granulosa. In a very early stage it is easy to demonstrate the relation of such a cyst to the oöphoron. As the cyst enlarges it causes rapid absorption of the paroöphoron, and the region in which it arose is then not so easily demonstrable.

It is only by patiently waiting for opportunities of securing cysts in very early stages that it is possible to elucidate their mode of origin. Much of the confusion which obscures the pathology of this question is due to the fact that most investigators have devoted their attention mainly to large cysts.

Occasionally we may be so fortunate as to secure a cyst of some size which has not destroyed the relation of the parts. Such a specimen is shown of natural size in Fig. 13. The evening before the operation the patient commenced to menstruate; when the cyst was drawn up from the pelvis a small rounded aperture was noted in the peritoneal covering from which a few drops of blood issued. Examination of the parts showed this to be a recently ruptured follicle.

The tissue lining the interior of oöphoritic cysts varies greatly. In cysts of the size shown in Fig. 12 it is membrana granulosa; in cysts of the size shown in Fig. 13, or even three times larger, the walls will be covered with stratified epithelium. In large cysts containing several pints, or even two or three gallons, of fluid, the walls will be found to consist entirely of fibrous tissue; no epithelium can be detected. It is impossible to state definitely the size of a cyst in which epithelium disappears. The absence of epithelium is due to atrophic changes, the consequence of the continual pressure

exerted by the accumulating fluid. Precisely similar

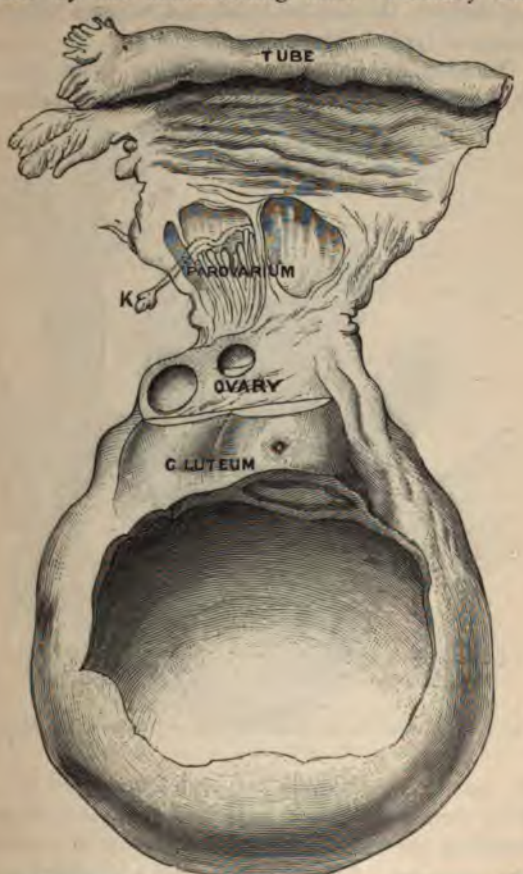

Fig. 13.—Oöphoritic Cyst. Natural size. (After H. W. Freeman.) On its surface is a recently ruptured follicle.
K, Fimbriated Kobelt's tube.

changes may be studied in the mucous membrane of greatly distended gall-bladders.

In large cysts, although the main cavity is destitute of epithelium, the smaller loculi and recesses will present a lining of typical columnar epithelium.

Occasionally unilocular oöphoritic cysts are filled with fluid identical in its physical and chemical characters

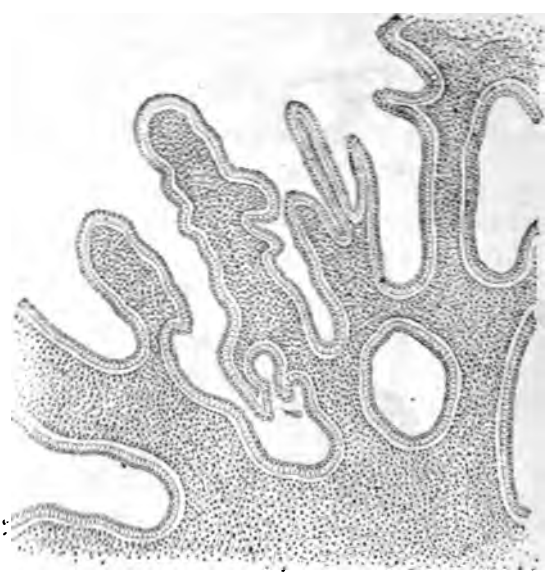

Fig. 14.—Section of Mucous Membrane from an Ovarian Cyst. Magnified.

with mucus. Such cysts are sometimes lined with soft velvety membrane, raised here and there into elevations resembling the cotyledons of the uterus of a ruminant when pregnant. The microscopical characters of the tissue are exactly similar to mucous membrane; the epithelium covering it is columnar in type, and dips below the surface to form complex mucous glands.

The credit of recognising mucous membrane in

ovarian cysts belongs to Poupinel.* My observations were made quite independently, and in ignorance of Poupinel's paper. As will be shown in the next section,

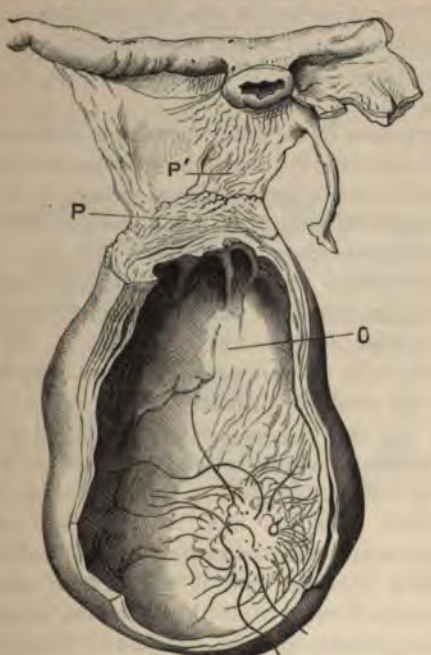

Fig. 15.—Unilocular Ovarian Dermoid. Natural size. (*Trans. Obstet. Soc., London.*)
O, Dermoid; P, paroöphoron; P', parovarium.

mucous membrane occurs more frequently in multilocular than in unilocular cysts (Fig. 14).

In a certain proportion of unilocular cysts the walls are lined with skin, furnished with hair, sebaceous and sweat glands, sometimes teeth and other dermal

* *Archives de Physiologie*, Series iii. vol. ix.

appendages. A specimen of this is sketched in Fig. 15. This cyst is of some interest, for it is of the size of an egg and strictly limited to the oöphoron; it is, as has been pointed out earlier in this chapter, unusual to find the paroophoron intact when an oöphoritic cyst attains such proportions as in the specimen from which this sketch was made.

The variations in the lining membrane and contents of unilocular oophoritic cysts may be summarised thus:—

(1) Epithelium is usually absent in large cysts.

(2) A layer of stratified cells is present in cysts of moderate size.

(3) The interior may be clothed with mucous membrane, furnished with glands and covered with columnar epithelium.

(4) Skin, with its various appendages, may line the cyst wholly or in part.

(5) In size they may vary from an ordinary ovarian follicle to a cyst containing gallons of fluid.

(6) The contents may be a thin colourless fluid or thick tenacious mucus. The fluid may be grumous, from admixture with blood. When skin lines the cyst it will contain pultaceous matter formed of shed epithelium, sebum from the glands, epithelial *débris*, and shed hair.

2. **Multilocular cysts.**—In this group the various tumours are for the most part made up of a congeries of cysts of varying size, so that in typical specimens a section carried through the more solid parts of the tumour has an appearance not unlike a honeycomb. For convenience of description they will be considered in three sets—

(*a*) Simple multilocular cysts.

(*b*) Adenomata.

(*c*) Multilocular dermoids.

A typical specimen will be described to illustrate each variety, but it must be remembered that they pass by insensible gradations one into the other.

A very early stage is represented in Fig. 16. The cysts are restricted to the oöphoron. To the naked eye and with the microscope such cysts are indistinguishable from normal ovarian follicles. This may be spoken of

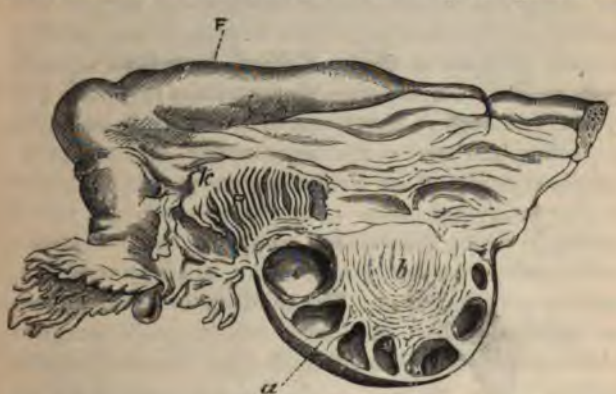

Fig. 16.—Human Ovary in section, showing a Multilocular Cyst in an early stage. *a*, Oöphoron; *b*, paroöphoron; P, parovarium; *k*, Kobelt's tubes; F, Fallopian tube.

as the indifferent stage; from this small beginning the cysts may increase in size until a tumour is produced of such large dimensions that life is rendered burdensome merely on account of the mechanical inconveniences its presence induces.

As the ovary increases in size, the various loculi may retain a simple lining of flattened epithelium: in many of the cavities it disappears. Frequently the epithelium exhibits very active changes, and the cysts become occupied by glandular structures, sometimes of great complexity. Such complex cysts are occasionally referred to

as multilocular glandular cysts, but they are more appropriately termed ovarian *adenomata*, and it is by the latter term that they will be designated throughout this work.

An ovarian adenoma is not only an important, but an extremely interesting, variety of tumour. As a rule, it has a dense fibrous capsule, and the surface is frequently lobulated. These tumours attain great dimensions, and are composed of innumerable cysts, which vary in size from a cavity no bigger than a pea, to one holding a quart or more of fluid. Critical dissections of such cysts enable us to recognise three varieties of loculi. In typical specimens a honeycomb-like mass will be found projecting into some of the larger cavities, and occupying usually one-third of its circumference, so that a section of the cavity resembles a signet-ring—such are called primary,—whilst the cavities occupying the honeycomb portion are secondary cysts, and are, as a matter of fact, mucous retention cysts. The third set of loculi contain no honeycomb-like structures, are of small size, and histologically are indistinguishable from distended ovarian follicles. The relations of the primary and secondary cysts to each other are shown in Fig. 17.

When complex cysts of this character are quite fresh, if the smaller loculi are punctured with a sharp knife and the fluid watched as it flows through the opening, a small opaque body, about the size of a rape-seed, will often be detected escaping. These bodies have been described as ova. Sometimes many of the cysts will project upon the surface of the tumour, having made their way through the capsule by absorption, and produce a resemblance not unlike a colossal bunch of grapes. Lawson Tait* has described cysts of this character as Rokitansky's tumour, and refers to a specimen in the Royal College of

* *Diseases of the Ovaries*, p. 174; 1883.

Surgeons' museum. Unfortunately, even with the aid of the pathological curator, I have been unable to identify the specimen. Mr. Reeves showed a specimen at the British

Fig. 17.—Portion of an Ovarian Adenoma, showing the varieties of Loculi. (*Trans. Obstet. Soc., London.*)
c, Primary; *d*, secondary.

Gynæcological Society, which Mr. Lawson Tait identified as a typical Rokitansky's tumour. I had the opportunity of examining this cyst. It was a typical ovarian adenoma, with cysts projecting through the capsule.

The primary cysts in their early stage are lined with rich columnar epithelium, and in that portion of their circumference which corresponds to the honeycomb of larger cysts mucous glands are found. Indeed, the lining membrane of such cysts is identical with mucous

Fig. 18.—Ovarian Adenoma, presenting a Cutaneous Clump (*d*) with a Tuft of Hair (*h*). (*Trans. Obstet. Soc., London.*)

membrane. Occasionally a lock of hair may be detected sprouting into one of the larger loculi.

The museum of St. Thomas's Hospital contains an excellent example of this. The specimen is mounted in the teaching series as a typical multilocular ovarian glandular cyst (adenoma). Sprouting from a small dermoid patch in one of the larger loculi is a tiny tuft of hair (Fig. 18).

From multilocular cysts lined with mucous membrane we pass to those which possess in one loculus a small tuft of hair, to others which present skin or mucous membrane furnished with hair, sebaceous or sudoriparous glands, unstriated muscle fibre, fat, and teeth in every loculus.

Occasionally tumours occur presenting three distinct

Fig. 19.—Transverse Section of an Ovarian Tumour from a Mare; it weighed eighty-four pounds.

A, Oöphoron; B, paroöphoron; F, Fallopian tube.

types of cysts: that is, one set of cysts contains skin, hair, sebaceous glands, and teeth; another presents only clusters of mucous glands and mucous cysts; and the third set is indistinguishable from ovarian follicles.

Thus, as in the case of unilocular cysts, it is impossible to demarcate between adenomata and dermoids. In specimens without glands it is often impossible to determine whether the lining membrane should be classed as mucous membrane or skin.

Multilocular cysts with dermoid contents are of such

interest that a special chapter will be devoted to the consideration.

It has been mentioned that in the human ovar when cystic, the relation between the oöphoron an paroöphoron is quickly destroyed. In some mammal especially the mare, the paroöphoron is relatively ver large. It happens that when the ovary of the mare cystic, the paroöphoron is uninvaded by the cysts, eve when the organ is much enlarged. Thus, in the spec men from which Fig. 19 was obtained the tumour weighe eighty-four pounds; yet on transverse section it wa readily observed that the paroöphoron remained quit distinct from the egg-bearing portion. The loculi in th large ovary were, in many instances, indistinguishabl from enlarged ovarian follicles: some of the larger space contained mucous membrane.

The *malignancy* of *ovarian adenomata* requires carefu investigation. Evidence is accumulating in favour of th view that rapidly-growing adenomata of the ovary may, the loculi rupture, infect the peritoneum. In som isolated cases there is reason to believe that the growt recurred in the pedicle.

CHAPTER VI.

OVARIAN DERMOIDS.

The adjective dermoid should be applied to cysts of the ovary when they contain skin or mucous membrane. Frequently dermoids contain both these structures. The amount of skin in a dermoid varies greatly in different cysts, and in the complexity of the cutaneous appendages with which it may be furnished. In some specimens the wall of a large cyst will be completely covered with skin, whilst in others it will be restricted to a small area, or even be confined to a small loculus in a multilocular cyst.

The following cutaneous appendages have been found in ovarian dermoids:—Hair, sebaceous glands, sweat-glands, teeth, mammæ, horn, nail, bone, unstriped muscle and tissue histologically identical with brain matter.

The *hair* of dermoids varies in length, colour, and amount. A single tuft coiled into a ball and mixed with sebaceous matter is not infrequent, and may attain a length of twenty inches. Mundé* has described and figured a specimen in which a tuft of hair in an ovarian dermoid was five feet long. Occasionally only a few hairs are found scattered on the cyst wall, or the hair may be rolled into balls and lie free in the cyst. The colour is equally capricious, and, as a rule, differs from that on the exterior of the individual. The hair in such cysts changes in colour with age, and in elderly

* *Amer. Journal of Obstet.*, vol. xxiv. p. 854.

persons becomes quite white, and is eventually shed, so that these cysts become actually bald.

Sebaceous glands are numerous and very large in size. Occasionally they become converted into retention cysts.

Sweat glands are not so frequent as the sebaceous variety, and generally occur in clusters.

The pultaceous material which fills these cysts is a mixture of epithelial *débris*, sebum from the sebaceous glands, shed hairs, oil, and cholesterine.

Unstriped muscle fibre is frequently found in the wall of ovarian dermoids, but the striped variety is very rare.

Bone is often present, either in loose, ill-formed, and shapeless masses, resembling in structure that found along the alveolar borders of the jaws, or as irregular plates, exceedingly hard, and resembling, as Doran suggests, the facial bones of an osseous fish.

Ovarian mammæ.—It is not uncommon to find in the interior of an ovarian dermoid one or more tags of skin resembling a *nipple* associated with teeth and hair. Not infrequently these nipple-like processes of skin are attached to more or less rounded projections of tissue, which recall in a striking manner the shrunken mammæ of a woman who has given suck to many children. The nipple-like processes of skin are imperforate, and beset with large sebaceous glands. In other cases the mammæ may be plump and well-formed, but consist of fat covered with skin. Even in such a case no ducts or gland tissue occupy the substance of the mass. The nipple may be surrounded by an areola. Such are called *pseudo-mammæ* (Fig. 20).

In a specimen described by Shattock the nipple was imperforate, but a cyst filled with colostrum occupied its base.

The most complete forms of ovarian mammæ contain

glandular tissue, which communicates with the cavity of the dermoid by means of ducts which traverse the nipples.

My most perfect specimen was obtained from a dermoid removed by Dr. Bantock. On dissecting the cyst, which was as large as a cocoa-nut, and filled with

Fig. 20.—Ovarian Dermoid, with a pseudo-mamma. (Museum, Royal College of Surgeons.)

the usual pultaceous material and hair, I observed a mamma projecting from the cyst wall. It was as large as a Tangerine orange, and furnished with two slender elongated nipples, which were attached to the wall of the cyst by their distal extremities. The base of each nipple was surrounded by an areola. Each nipple was perforate, and communicated with glandular tissue in the midst of the mamma. The glandular portion was small in amount, and embedded in rich yellow fat. The ducts

and passages were filled with fluid resembling very poor,

Fig. 21.—Mammiferous Dermoid. Half the natural size. (*Trans. Path. Soc.*)
The gland has two tube-like nipples, one of which has been divided.

but viscid, milk. Under the microscope this fluid had all the characters of milk, and contained colostrum globules.

Structurally, the secreting tissue of the gland differed

from a normal mamma only in the character of the epithelium, which, instead of being cubical in shape, was spheroidal, and several rows deep (Fig. 21).

Dr. Desiderius von Velits * has described a most perfect example of an ovarian mamma which yielded milk and colostrum.

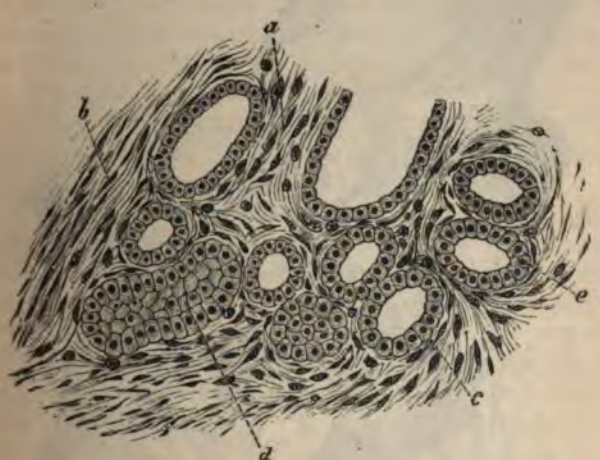

Fig. 22.—Histological Characters of the Ovarian Mamma described by Velits. *a*, Pigmented connective tissue; *b*, plain muscle fibre; *c*, *d*, and *e*, gland-acini and ducts.

Up to the present time I have not succeeded in obtaining, in so far as histological details go, so perfect a specimen as that described by Velits. In his case the glandular elements were typical of the normal mamma (Fig. 22).

Horn and nail.—Horns resembling those which grow from sebaceous cysts are occasionally found in ovarian dermoids, and tissue identical with nail has been

* Virchow's *Archiv*, Bd. cvii. s. 505.

Fig. 23.—Ovarian Dermoid. (*Trans. Obstet. Soc., London.*)
The lower part of the tumour contained teeth-germs in early stages of development.

described growing from the extremity of a finger-like skin-covered projection from their walls.

Teeth.—A large proportion of ovarian dermoids contain *teeth*. In *number* they vary considerably; sometimes two or three are found, in others twenty, and as many as four hundred have been counted. It is unusual to find more than twelve teeth in a cyst. As a rule they are embedded in loose bone resembling alveolus, or project from a flat bony plate like nails driven into a piece of thin wood.

They develop on the same plan as teeth in the normal situation. Their mode of development I was able to study under unusually favourable conditions.

The tumour represented in Fig. 23 is shown nearly natural size. It consisted of two parts: one was a thin-walled cyst full of sebaceous material, and lined with piliferous skin. The larger portion was nearly solid. When sections of this part, removed from the spot marked H in the figure, were prepared for the microscope, they presented enamel organs, dentine papillæ, hair, glands, and epithelial pearls in early stages of development. *Epithelial pearls* are rounded bodies resembling the boiled lens of a fish; they are occasionally found free in dermoids. They are composed entirely of epithelial cells. (*See* Plate I., Frontispiece.)

Teeth are not scattered irregularly through the tumour unless present in very great number, but are collected together in one or more groups. They vary greatly in shape and resemble incisors, canines, and supernumerary teeth (Fig. 24).

In the majority of cases the root is single; when the crown is simple the root is long; multicuspidate teeth have short roots. Ovarian teeth with more than one root are very rare.

In ovarian teeth enamel and dentine are invariably

present; cementum is not so constant. The enamel is lodged upon the crown in lumps or hummocks, with deep ravines extending to the dentine. The fibres of the enamel run in all directions (Fig. 25).

Fig. 24.—Ovarian Teeth: showing Canines, Bicuspidate, and Multicuspidate Teeth.

G, Geminated tooth; B, caniniform tooth; C, crown showing so-called caries: multicuspidate crown.

The pulp is very irregular; some of the teeth, especially those resembling incisors and canines, may lack a central chamber. In multicuspidate teeth the pulp chamber is of fair size. In some the pulp is converted into osteo-dentine; in others it is full of fat globules.

The presence of nerves in the pulps of ovarian teeth

was asserted by Salter, and tissue resembling nerve-fibrils may be detected in pulp suitably prepared.

The existence of *nerves* in ovarian dermoids requires further investigation before we can be sure that the fibrils in the pulps of the teeth are really nerves. My own observations led me to believe that the skin of dermoids is sensitive, and it must, therefore, contain nerves, but their presence and the existence of peripheral end-organs have yet to be satisfactorily demonstrated.

Fig. 25.—Microscopic characters of a Multicuspidate and Bicuspidate Ovarian Tooth.

In A the pulp chamber contains osteo-dentine; in B the pulp chamber is exceedingly small, and occupied with osteo-dentine; cementum is absent from the fangs.

The clearest example of nerve tissue in a dermoid which has come under my own notice was in a specimen removed by Dr. Bantock. The patient had a dermoid in each ovary. The left tumour was multilocular, and one of the loculi contained what appeared to be a pedunculated cystic body as large as a cherry. On incising this, some peculiar diffluent white substance, like brain matter, escaped. The walls of this cyst were composed of tough

fibrous tissue, like dura mater; the interior had a lining of highly vascular membrane, like pia mater. Attached to this were fragments of tissue, resembling the grey matter of the spinal cord, presenting large ganglion cells entangled in neuroglia.

Fig. 26.—Ovarian Dermoid.

The loculus, C, contains a small cyst filled with tissue microscopically identical with brain matter. F.t. Fallopian tube; *fimb*, fimbriæ.

Nerve matter has been detected in ovarian dermoids by Gray,* and recently by Neumann.† The nerve tissue in Dr. Bantock's specimen existed in circumstances identical with those described by Gray and Neumann.

It is a fact of great interest that ovaries even when occupied by fairly large dermoids sometimes successfully

* *Med. Chir. Transactions*, vol. xxxvi. p. 434; 1853.

† Virchow's *Archiv*, 1889.

discharge their functions. In 1885 Mr. Thornton reported to the Obstetrical Society details of a case in which he performed double ovariotomy during pregnancy. The patient was twenty-two years of age. Both tumours were dermoid. One had a twisted pedicle, the other was impacted in the pelvis. The left one had a well-developed corpus luteum on its outer surface.

In 1890 Dr. Bantock* performed double ovariotomy on a lady in the third month of pregnancy. Both tumours were dermoids. They were submitted to me for examination. Even after microscopic investigation I was unable to detect normal ovarian tissue. The tumours from Dr. Bantock's patient are represented in Figs. 26 and 27.

Cullingworth† has recorded an instance in which both ovaries were converted into dermoids in a woman thirty-nine years of age. She had had twelve children and three miscarriages—the last, three months before operation; and he remarks: "One would find it difficult to define the precise amount of ovarian disease that is necessary to render a woman sterile."

The dermoids in this case have been carefully described by Shattock.‡

Dermoids occur at all periods of life. They have been recorded in the ovary at birth and in patients upwards of eighty years of age. I have devoted much labour to the examination of fœtal ovaries, but have never succeeded in detecting an ovarian dermoid at birth, neither can I refer the reader to a trustworthy case. In chapter viii. references are furnished of many examples removed from children under fifteen years of age.

* *Journal of the Brit. Gyn. Soc.*, January, 1890.
† *St. Thomas's Hospital Reports*, vol. xvii.; 1889.
‡ *Trans. Path. Soc., London*, vol. xxxix. p. 442.

In 1890 Mr. John Ewens, of Clifton, was good enough to send me, for examination, an ovarian dermoid, as

Fig. 27.—Ovarian Dermoid from a pregnant Woman. (The tumour of the left side is represented in Fig. 26.)
F.t., Fallopian tube; *fimb*, fimbriæ; T, teeth.

large as a cricket-ball, he had successfully removed from a girl of seven years. Besides many teeth, six of which were fully erupted, it contained a lock of hair 75 cm. in length.

Potter * has recorded a case in which a woman eighty-three years of age died after a severe burn. She had an ovarian dermoid which had made one complete rotation. The tumour, so far as was known, had never caused her any inconvenience.

Among exceptional cases of ovarian dermoids the following deserve mention :—

Matthews Duncan† mentions a case which came under his care, in which Mr. Langton removed "both ovaries, both being dermoid cysts. A third cyst, the size of an egg, having hair growing from its inner surface, was removed from between the layers of the mesentery; it had no connection with either ovary. In both of these cases there was good recovery, so that the precision attainable by autopsy was not obtained." Ovarian dermoids associated with detached cysts in this way are excessively rare. The most remarkable case is described by Moore.‡

A married woman, twenty-eight years of age, had suffered from an abdominal tumour for ten years. It suppurated, and the pus escaped through a fistulous opening at the umbilicus. She died a few days after her admission into the Middlesex Hospital. At the *post mortem* examination a huge ovarian dermoid, universally adherent, was found, containing large quantities of hair and a great number of teeth.

"Among the peritoneal adhesions were many small cysts, some of which were attached by slender pedicles to the main cyst; whilst others were entirely unconnected with it, but, like it, contained soft, cheesy, yellow epithelium, mixed with hairs. One was in the great omentum. Two, which were in, or near, the right broad ligament, and

* *Trans. Obstet. Soc., London*, vol. xii. p. 246.
† *Ibid.*, vol. xxiv. p. 318.
‡ *Trans. Path. Soc., London*, vol. xviii. p. 190.

of the sizes of a nutmeg and a walnut, had ossified, or chalky, walls. Many small ones were in situations where they might have been supposed to be diseased absorbent glands, as in the pelvis or mesentery. . . . . The largest of the loose cysts lay among the adhesions of the small intestines. It was completely separated by the bowels from the principal cyst, and it was rather larger and longer than a hen's egg."

Such a case raises the important question of *metastasis* in relation to ovarian dermoids. In the description of papillomatous cysts it will be pointed out that when they rupture epithelial elements engraft themselves upon the peritoneum, and form warts. There is good reason to believe that similar transplantation occurs with dermoids.

Kolaczek* reported a case in which Martini removed from a single woman, forty years of age, an ordinary ovarian dermoid as large as a man's head. Its surface was perfectly smooth. After the escape of some ascitic fluid the peritoneum was seen to be dotted with small yellow knots; many of them were furnished with a small tuft of light hair, which projected into the peritoneal cavity. This case is unique.

Dermoids are usually regarded as innocent tumours, but a collective investigation of this subject raises considerable doubt, especially when they occur before puberty. The evidence on this matter is set forth in chapter viii.

As far as possible, theoretical points have been excluded in this chapter. Those who feel inclined to study the subject more fully will find further information in my little monograph on Dermoids. A more recent research on the structure and development of ovarian teeth and the formation of epithelial pearls I communicated to the Odontological Society of Great Britain in 1890.†

* Virchow's *Archiv*, Bd. 75, s. 399.
† *Trans. Odonto. Soc.*, vol. xxii. p. 156.

CHAPTER VII.

SOLID TUMOURS OF THE OVARY.

SOLID tumours of the ovary are far less common than the cystic variety and form about five per cent. of the cases submitted to operation. They form four groups :— Fibromata, Myomata, Sarcomata, and Carcinomata. The occurrence of the first three forms is no matter for surprise, as the ovary contains connective tissue in abundance, and a small amount of unstriped muscle fibre.

Fibromata.—Fibrous tumours of the ovary are very rare. Doran,* who has written an admirable monograph on this subject, states that he has examined microscopically three solid ovarian tumours, which appeared as though entirely made up of white fibrous tissue. The minute structure of such tumours consists of characteristic wavy bundles of fibrous tissue in most parts of the sections, packed closely together. Intermixed with these are small round cells, and among the fibrous tissue, lying in the long axis of the fibres composing the bundles, a few small spindle cells were detected. Thus the histology of ovarian fibromata is identical with fibrous tumours occurring in other situations.

Ovarian fibromata sometimes attain a large size. Dr. John Williams† has described a specimen which weighed 7 lbs. 7 ozs. A large cyst was connected with the tumour ; on its thin tough walls there were a few papillæ.

* *Trans. Obstet. Soc.*, vol. xxix. p. 410 ; "On Myoma and Fibro-myoma of the Uterus and Allied Tumours of the Ovary."

† *Trans. Obstet. Soc., London*, vol. xxx. p. 247 and p. 513.

The pedicle was twisted. A committee of the Society reported that the tumour was an almost pure fibroma.

Doran briefly mentions, in the paper to which reference has been made, the following facts relating to a large fibroma of the ovary removed by Mr. Thornton, in 1884, from a woman twenty years of age. She married at the age of fifteen, but had never borne children. Previous to the operation sexual desire appears to have been absent. After recovery the instinct rapidly developed: the patient left her husband, and bore a child to another man. Ultimately she returned to her home, and in 1888 was in good health.

The pedicle was long and narrow, and the relation of the tube and broad ligament proved clearly that the tumour was ovarian. The uterus was healthy, the opposite ovary small and infantile.

Myomata.—Tumours of the ovary composed mainly of unstriped muscle fibre, or a mixture of muscle and fibrous-tissue—fibro-myomata—are more frequent than the pure fibromata, but they are not by any means common.

Unstriped muscle tissue occurs in the ovary in the form of longitudinal bands, which are prolonged from the ovarian ligament, and penetrate the tissues of the paroöphoron.

In determining the nature of a solid ovarian tumour we encounter the well-known histological difficulty of deciding between a myoma and a spindle-cell sarcoma.

A few years ago Mr. J. Taylor, of Birmingham, sent me an enlarged ovary, which he removed from a young woman. Before removal there had been much difference of opinion as to the nature of the enlargement: one surgeon expressed the opinion that the condition was due to inflammation. On cutting through the ovary its centre was found occupied by tissue, resembling in colour

old blood-clot, the ovarian tissue being expanded over it like a capsule. The relation of the parts is shown in Plate II. Under the microscope this tissue was found to be composed almost entirely of large spindle-cells.

At that time my experience of these tumours was not extensive, and I felt great difficulty in deciding whether this tumour should be regarded as a sarcoma or myoma.

Fig. 28.—Ovarian Fibro-myoma. (Museum of the Hospital for Women, Soho.
F, Fallopian tube.

I inclined to the opinion that it was a sarcoma, and suggested that the subsequent history of the case would settle the true nature of the tumour. Several years have elapsed, and there has been no evidence of recurrence.

This is the earliest stage in which I have had opportunity of examining a tumour of this type. Ovarian myomata sometimes attain large dimensions.

The museum of the Hospital for Women, Soho, contains a specimen of ovarian fibro-myoma removed by Mr. Reeves (Fig. 28). It weighs about 3 lbs., and, on

section, presents the usual whorled appearance of a uterine fibro-myoma.

The museum of the Royal College of Surgeons contains a specimen weighing 15 lbs. 2 ozs., removed by Sir Spencer Wells from a single woman, sixty-eight years of age. She had noticed the tumour eight years. It had a good pedicle; the Fallopian tube and broad ligament were free from disease. Doran, who has carefully examined and figured this tumour, found it to be a myoma.

Bagot* has recorded a case of fibro-myoma of the ovary from a woman aged forty-four years. The tumour was small.

Ovarian myomata and fibro-myomata resemble, in their minute structure, similar tumours of the uterus: they may consist of large fusiform cells with little fibrous tissue, or the fibrous tissue may predominate. There is some evidence to lead us to believe that the tissue of which they are composed may undergo myxomatous change, and form spurious cysts.

Sarcomata.—Ovarian tumours belonging to this group deserve more careful study than they have hitherto received. They differ from sarcomata generally in the fact that frequently both ovaries are affected primarily in the same patient, and in the circumstance that masses of tissue, which under the microscope are indistinguishable from sarcomatous tissue, occur not infrequently in association with ovarian dermoids. It has been stated that malignant deposits have occurred in the pelvis after removal of dermoids containing such sarcoma-like tissue.

Ovarian sarcomata may belong to the spindle-celled or round-celled varieties. Spindle-celled sarcoma seems the more frequent.

* *Trans. Royal Acad. of Med., Ireland*, 1890, vol. viii. p. 322.

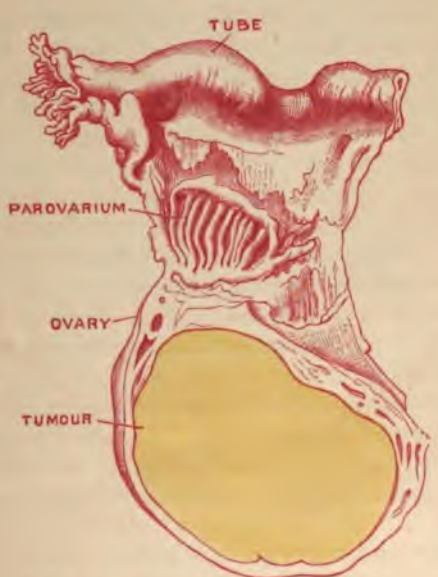

Plate II.—Myoma of the Ovary. Natural size.

It is important to remember that the majority of solid ovarian tumours which are classed in museums as fibromata of the ovaries are in nearly all cases examples of ovarian sarcomata.

A striking illustration of this is a case described by Cullingworth.* 'A woman, aged thirty-six years, came under observation complaining of slight uterine hæmorrhage, which lasted continuously for three months. Two hard, solid, nodulated tumours were discovered in the pelvis. The patient had been aware of the existence of an abdominal swelling for five years. Three months after seeking advice she began to lose flesh, and fluid accumulated in the abdomen. A month later effusion into the left pleura was recognised, and she died somewhat suddenly a few weeks afterwards.

At the *post mortem* examination two solid ovarian tumours were found. They were firm and nodulated, whitish in colour, with a smooth, glistening surface. The specimens were regarded by Dr. Dreschfeld, who examined them microscopically, as fibromata. When the tumours were exhibited at the Obstetrical Society they were re-examined by a committee, and the specimens were subsequently reported to be mixed-celled sarcomata.

The pathology of solid ovarian tumours is extremely unsatisfactory, and requires most careful consideration. It is not a subject that can be settled by simply collecting reports of cases from periodical literature, or even by the examination of museum specimens, unless such possess a careful history.

The absence of accurate knowledge is in a large measure due to the infrequency of solid, in comparison with the frequency of cystic tumours of the ovaries.

* *Trans. Obstet. Soc., London*, vol. xxi. p. 276.

Ovarian sarcomata differ from sarcomata in general in several important particulars. In the first place, both ovaries are frequently affected primarily. This is contrary to the rule of malignant tumours. Occasionally we meet with cases in which there is a general outbreak of sarcoma, nodules appearing in various parts of the body almost simultaneously. Such instances are rare. Primary sarcoma appearing simultaneously in two long bones of an individual, or both testicles, is almost unknown; yet in the ovaries it appears to be the rule. The form of sarcoma which can be compared with ovarian sarcoma in this respect is glioma of the retina.

Messrs. Lawford and Collins,* in their careful analysis of sixty cases of glioma retinæ, ascertained that in twelve cases the disease attacked both eyes simultaneously, or with very short intervals; and Hirschberg, in a similar analysis of sixty cases, found both eyes affected in fourteen.

Judging from the imperfect records of ovarian sarcoma, I have come to the conclusion that both ovaries are affected in the proportion of about twenty per cent. of the cases.

Sarcoma of the ovary grows very rapidly, and sometimes attains in a few months a large size. Dr. Carter† described a specimen which in a period of about six months grew so large that on removal it weighed more than 10 lbs.

The subject of ovarian sarcomata in children is considered in the next chapter.

Carcinomata.—In the majority of instances cancer of the ovary is secondary. Our knowledge of primary

* *Royal London Ophth. Hospital Reports*, vol. xiii. p. 2.

† *Trans. Obstet. Soc., London*, vol. xxix. p. 190.

cancer of this organ is very limited, and, except in a few instances, extremely unsatisfactory.

The term cancer must be used in a definite sense, and reserved for malignant adenomata. An adenoma is a neoplasm conforming in histological details to the type of a secreting gland. The less perfectly an adenoma mimics a gland, the more likely is it to exhibit malignant properties, and come under the denomination "Cancer." Adenomata and carcinomata have a common feature in the possession of epithelium arranged in a definite manner. The curious expression so frequently used by some writers that cancer or a sarcoma is a reversion to the fœtal type is, to my mind, meaningless, except that it indicates either a love for the mysterious or else ignorance.

There is good anatomical reason to lead us to believe that primary cancer may arise in the ovary. Adenomata of most perfect form, and furnished with highly-developed epithelium, arise in the ovary, and experience proves that wherever adenomata are found cancer also occurs. To discuss the source of the epithelium is so purely morphological as to be beyond the scope of this work.

Shattock* has recorded a *case of columnar-celled carcinoma of the ovary.* The ovary was converted into a great lobulated oval tumour, eleven inches by five in its chief diameters. Histologically, it consisted of tortuous loculated channels, of various forms, according to the direction of their section, lined with remarkably tall, slender, and very closely-compressed columnar epithelium, disposed in a single layer, and everywhere bounding a lumen. "The stroma between the spaces is of a delicate richly-celled connective tissue, and is about in the same proportion as the tubular elements. The contents of

* *Trans. Path. Soc.*, vol. xl. p. 208.

the spaces are sharply demarcated from the cells, and consist in many of an unstained glassy, minutely fissured substance, presenting very clear traces of concentric lamination."

Doran* refers to an ovarian tumour removed by Thornton from a girl fifteen years of age, which he regards as an undoubted example of cancer. On microscopical examination it was found to consist of cells closely packed in alveoli formed by dense connective tissue (Fig. 35).

The youth of this patient introduces an element of doubt as to whether we have to deal with cancer in this case. The peculiar histological characters should be compared with those presented by solid ovarian tumours occurring in children at birth. These tumours present characters which isolate them from cancers in general, as well as from the more usual forms of sarcomata, and which are discussed in the ensuing chapter.

In Shattock's case the clinical course was very rapid. The tumour had only been noticed six months before the patient came under observation. An attempt was made by Mr. Pitts to remove it, but the patient's condition became so critical that the operation was abandoned. The woman died forty-eight hours after the operation.

Secondary cancer.—It is a curious rule that organs which are frequently the seat of primary cancer are rarely the seat of secondary deposits, and *vice versâ*. To this the ovaries are not exceptions, and, what is somewhat remarkable, secondary cancer affects both organs in more than half the cases.

The relative frequency with which the ovaries are affected with secondary deposits of cancer has not been

* *Tumours of the Ovary*, p. 103.

investigated on any very extensive basis. Nevertheless, some attention has been given to this question, and it would appear that mammary cancer and melanotic tumours give rise to secondary deposit in the ovaries.

Dr. Sidney Coupland* reported to the Pathological Society a case of mammary cancer which occurred in the

Fig. 29.—Section of an Ovary, with Secondary Deposits of Melanotic Cancer. Natural size.

right breast of a woman twenty-four years of age. The breast was removed and she remained well for five months, then two recurrent knots appeared in the scar. These were removed. A few weeks later "a sudden and rapid evolution of secondary knots took place"; the left breast and all the soft tissues on the front and sides of the chest became infiltrated and converted into an inflexible and brawny cuirass, and in three weeks she died. Mr. J. W.

* *Trans. Path. Soc.*, vol. xxviii. p. 259.

Hulke, who had charge of the patient, informed Dr. Coupland "that in all his experience he had never seen so rapid a recurrence and extensive diffusion of cancer take place in so short a time."

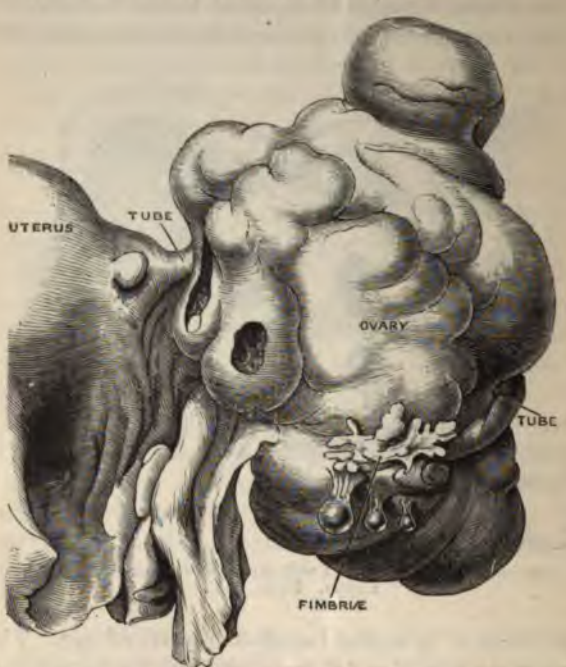

Fig. 30.—Cancer deposits in Ovary; secondary to Cancer of Breast. Both ovaries were affected. Nearly natural size.

At the *post mortem* examination the abdominal organs and peritoneum were free from secondary growth, except the ovaries. The "cancer had attacked the ovaries symmetrically, and so symmetrically that in size and appearance these organs differed hardly at all from each other. Each was enlarged to the size of a chestnut, was

adherent to its Fallopian tube, and presented slight lobulation. On section the ovary was soft, of a pure white colour throughout, presenting no traces of normal structure. Microscopically it presented the characters of cancer, the stroma being reduced to a minimum."

The careful description of this remarkable case is rendered more valuable by the fact that a table is appended, compiled from annual reports of the Surgical Registrars of the Middlesex Hospital, June, 1867, to 1874 inclusive, showing the relative frequency of secondary implication of viscera in mammary cancer, as ascertained by *post mortem* examination.

The total number of cases was 89; the ovaries were attacked five times. In three cases both ovaries were the seat of secondary deposits, and in two, one ovary only was implicated.

Secondary deposits of cancer in the ovary are more frequent than even Dr. Coupland's interesting paper indicates. During the years 1887, 1888 and 1889 there were fifty-two inspections of patients dying from cancer of the uterus, and twenty-nine from cancer of the breast. The frequency with which secondary deposits were found in the ovaries is shown in the subjoined table:—

UTERUS.	OVARIES.
52 cases.	Deposits in both glands, 3 cases.
	Deposits in one gland, 3 cases.
BREAST.	
29 cases.	Deposits in both glands, 3 cases.

I intentionally selected those three years because during that period especial attention was devoted, by Mr. L. Hudson who made the examinations, to the diseases of the internal generative organs of the female.

Of course no case is included in which the ovary was involved by *extension* of uterine cancer.

Many cases of secondary nodules of melanotic tumours have been observed in the ovary. This is due to two causes: secondary nodules in this disease are so widely disseminated, and the colour betrays them to the eye of even the least experienced pathological anatomist. It is quite possible that in some cases described as primary sarcoma or carcinoma of the ovary, the growth in the ovary was really secondary to cancer of some other organ, especially in those cases where rapid spread of the disease followed ovariotomy.

Cancer of the ovary secondary to cancer of the breast or uterus produces a characteristic lobulation of the organ, whereas secondary melanotic deposits are rarely large enough to affect its shape. Compare in this respect Figs. 29 and 30.

CHAPTER VIII.

OVARIAN TUMOURS IN INFANCY AND CHILDHOOD.

TUMOURS of the ovary occur in fœtal and infant life. In the fœtus they are not infrequent. The museums of the Royal College of Surgeons, University College, and St. Thomas's Hospital contain several specimens. Cysts

Fig. 31.—Uterus and Ovaries of a Child two months old. Natural size. Each ovary is occupied by a cyst, that in the right ovary has a secondary loculus.

of the *oöphoron* in newly-born children have been figured and described by Winckel,* Cullingworth,† and others. I have examined microscopically five specimens which have come under my notice in fœtuses. No one who has systematically dissected stillborn children can have failed to observe them.

* *Lehrbuch der Frauenkrankheiten*, 1886.

† *Obstetrical Journal of Great Britain*, vol. ii p. 401.

Congenital ovarian cysts may be unilocular or multilocular, unilateral or bilateral. A typical example occupied the left ovary of the specimen sketched in Fig. 31. That in the right ovary is somewhat exceptional in that it contains a secondary loculus.

Fig. 32.—Multilocular Ovarian Cyst from a Fœtus born at full time. One and a half the size of nature.

An example of a multilocular congenital cystic ovary is represented in Fig. 32. It is quite possible that such cysts develop into large tumours. I have collected a number of cases of large cystic ovaries that have been observed in girls between the first and fifteenth years of life.

The largest ovarian tumour in a fœtus on record is a case reported by Doran.* A fœtus of the seventh month was born with its abdomen distended and the

* *Trans. Path. Soc.*, vol. xl. p. 200.

subcutaneous veins prominent. It survived the birth only two minutes. On opening the abdomen, ascitic fluid escaped, and an ovarian tumour was discovered on each side. The larger tumour is shown a little reduced in size in Fig. 33. "When fresh, it was of a bright pink colour, faintly tinged with lilac." The surface exhibited numerous minute elevations, as though produced by cysts. There were no adhesions. The tumour

Fig. 33.—Tumour of the Ovary from a seven months' Fœtus. A little less than natural size. (After Doran.)

consisted of a thin shell of solid material, enclosing a large central cavity containing clear fluid. The tumour of the left ovary was slightly smaller than its fellow. Sections of the tumour when viewed with the naked eye appeared as a wide-meshed net-work with trabeculæ, the spaces being filled with semi-transparent material. Under the microscope the trabeculæ appeared to consist of a multitude of small round cells in a homogeneous matrix. Among this tissue ovarian follicles were recognised.

After a careful and detailed description of the histology of the specimen, Doran comes to the conclusion

that the enlargement of the ovary was due "to hyperplasia of the entire embryonic tissue of the oöphoron."

It is fortunate that so rare a specimen came into the hands of such a competent observer. The microscopical characters of sections prepared from this ovary are depicted in Fig. 34; and it is remarkable to notice, as

Fig. 34.—Histological Characters of the Tumour of the Ovary of a seven months' Fœtus. (After Doran.)
c, Wall of the cavity; *f*, ovarian follicle with ovum.

Doran also observes, that the cells which form so conspicuous a part in its structure are identical in appearance with those which are so abundant in the ovarian stroma early in fœtal life. The histology of this remarkable ovary is interesting in its bearing on the solid ovarian tumours occurring in infants and girls under puberty. The following table contains a list of sixty cases of ovarian cysts and tumours occurring before the fifteenth year, which I have collected and briefly analysed.

TABLE OF CASES OF OÖPHORITIC TUMOURS IN INFANTS AND GIRLS UNDER FIFTEEN.

REPORTER.	AGE.	RESULT.	NATURE OF TUMOUR.	REFERENCE.
Küster (for Roemer)	1 yr. and 8 mths.	Ovariotomy: recovery.	Dermoid	*Deutsche Med. Woch.*, Dec. 26th, 1883.
J. F. Hooks	2 yrs. and 6 mths	Ovariotomy: death.	Dermoid; very adherent.	*Am. Jour. Obstet.*, vol. xix. p. 1022.
Kidd (for Neville)	2 yrs. and 11 mths.	Ovariotomy: death.	Dermoid	*Obstet. Jour. Gt. Brit.*, 1880, vol. viii. p. 241.
Alcock	3 years ...	Ovariotomy: death.	Multilocular cyst...	*Lancet*, 1871, vol. ii. p. 850.
Schwartz ...	4 years ...	Ovariotomy: recovery.	Adenoma	*Arch. für Gyn.*, vol. xiii. p. 475
Thomas ...	3 yrs. and 5 mths.	No operation death.	Tumour noticed one month after birth: described as an ordinary ovarian cyst.	*Am. Jour. Obstet.*, Jan. 1880, vol. xiii. p. 118.
Thornton...	4 years ...	Cyst opened, stitched to abdominal wound and drained: recovery.	Suppurating dermoid.	*Med.-Chir. Trans.*, vol. lxx. p. 75.
Boldt ...	4 years ...	Incision and drainage.	Suppurating ovarian cyst.	*Proc. Path. Soc., New York*, 1888, p. 63.
Mears (for Barker).	6 yrs. and 8 mths.	Ovariotomy: recovery.	Dermoid	*Phil. Med. Times*, Nov. 1st, 1871, p. 44.
Ewens ...	7 years ...	Ovariotomy: recovery.	Dermoid	Unpublished.
Thornton...	7 years ...	Ovariotomy: recovery.	Dermoid	*Brit. Med. Jour.*, 1881, vol. ii. p. 933.
Lucas ..	7 years ...	Ovariotomy recovery	Multilocular cyst..	*Trans. Clin. Soc., London*, vol. xxi. p. 224.
Cupples ...	7 yrs. and 6 mths	Ovariotomy recovery.	Dermoid	*Richmond & Louisville Med. and Surg. Jour.*, Dec. 1874. (See *Edin. Med. Jour.*, vol. xx. p. 1049.)
Spencer Wells.	8 years ...	Ovariotomy: recovery.	Dermoid	*Brit. Med. Jour.*, 1874, vol. i. p. 342.
Leopold ...	8 years ...	No operation	Cysto-sarcoma ...	*Arch. für Gyn.*, Bd. vi. s. 202.
Chenoweth	7 yrs. and 8 mths.	Ovariotomy: recovery.	Multilocular ... (weighed 16½ lbs.)	*Am. Jour. Obstet.*, vol. xv. p. 625.
Mackenzie	8 yrs. and 6 mths	Ovariotomy: recovery.	Dermoid	*Dublin Jour. of Med. Sci.*, 1888, vol. ii. p. 302.
Chenoweth	8 years ...	Ovariotomy: death.	Described as encephaloid (sarcoma).	*Am. Jour. Obstet.*, vol. xv. p. 625.
Peaslee ...	9 years ...	No details.	Dermoid	*Ovarian Tumours*, p. 59.
Malins ...	9 years ...	Ovariotomy: death	Sarcoma	*Lancet*, May 31st, 1890, p. 1174.
Dickinson	10 years ...	No operation death.	Dermoid	*Trans. Path. Soc.*, vol. xxv. p. 192.
Wagner ...	10 years ...	Ovariotomy: recovery.	Sarcoma	*Arch. für Klin. Chir.*, Berlin, 1884, vol. xxx. p. 504.
Emmet ...	10 years ...	No operation death.	Tumour weighed probably 50 lbs.	*Am. Jour. Obstet.*, vol. xiv. p. 674.

TABLE OF CASES OF OÖPHORITIC TUMOURS IN INFANTS AND GIRLS UNDER FIFTEEN (*continued*).

REPORTER.	AGE.	RESULT.	NATURE OF TUMOUR.	REFERENCE.
Halliday Croom.	11 years ...	Ovariotomy: recovery.	Sarcoma of both ovaries.	*Obstet. Trans., Edin.*, vol. xiv. p. 93.
Jotton, of Nantes.	12 years ...	Ovariotomy: abdomen opened by caustics; recovery.	Multilocular cyst...	*Gaz. Heb.*, June 18, 1869, p. 396.
Barlow and Marsh.	12 years ...	Ovariotomy: recovery.	Dermoid	*Clin. Trans., London*, vol. xi. p. 175.
Keith ...	12 years ...	Ovariotomy: recovery.	Semi-solid tumour ascites.	*Brit. Med. Jour.*, 1873, vol. ii. p. 592.
Lee, Robert	12 years ...	No operation death.	Dermoid	*Medico-Chir. Trans.*, vol. xliii. p. 103.
Baker Brown.	13 years ...	Incomplete ov.: death.	Solid tumour ..	*Ovarian Dropsy*, London, p. 260.
Baillie, Matthew.	12 or 13 years.	Dissecting-room subject	Dermoid	*Morbid Anatomy*, p. 199.
Griffiths of Swansea	12 years ...	Ovariotomy: recovery.	Dermoid	*Trans. Path. Society, London*, vol. xxviii. p. 196.
Schultze ...	12 years ...	Ovariotomy: recovery.	Dermoid	*Deut Zeitsch. für Prakt. Med.*, 1876.
Wegscheider.	12 years ...	No operation death.	Colloid tumour of ovary (Virchow)	*Beiträge z. Geburt. u. Gyn. der Geburt.; Ges. in Berlin*, 1870, i. p. 35.
Wagner ...	13 years ..	Ovariotomy: death.	Sarcoma	*Arch. für Klin. Chir.*, Berlin, Bd. xxx. s. 504.
Keith ...	13 years ...	Ovariotomy: recovery.	Dermoid	*Obstet. Jour. Gt. Brit.*, vol. iv. p. 31.
Koeberlé ...	13 years ...	Ovariotomy: recovery.	Multilocular cyst...	*London Med. Record*, Feb. 15th, 1876, p. 90.
Bell ...	13 years ...	Ovariotomy: recovery.	Unilocular ovarian; 8 pints of fluid.	*Lancet*, Feb. 26th, 1887, p. 418.
Koeberlé ...	13 years ...	No operation	Multilocular cyst...	*Gaz. Med. de Strassburg*, 1876.
Jessop ...	13 years ...	Ovariotomy: death.	Dermoid	*Lancet*, 1871, vol. ii. p. 431.
Fawcett-Battye.	13½ years .	No operation sudden death.	Cyst, with blood-stained contents; precise nature not ascertained; weighed 76 ozs.	*Trans. Path. Soc., London*, vol. ii. p. 280.
Haward ...	13 yrs. and 9 mths.	Ovariotomy: recovery.	Dermoid; twisted pedicle.	*Lancet*, May 15th, 1886, p. 920.
Bryant ...	14 years ...	Ovariotomy: recovery.	Multilocular	*Guy's Hosp. Rep.*, vol. xiv. p. 269, 1869.
Mundé ...	14 years ...	Electrolysis *then* ovariotomy: rec. by Thomas	Dermoid	*Trans. Am. Gyn. Soc.*, vol. ii.; 1877.
Smith ...	14 years ...	Ovariotomy: death.	Malignant disease (sarcoma?) of both ovaries.	*Lancet*, 1874, vol. ii. p. 501.

Table of Cases of Oöphoritic Tumours in Infants and Girls under Fifteen (*concludea*).

Reporter.	Age.	Result.	Nature of Tumour.	Reference.
Spencer Wells.	13 yrs. and 9 mths.	Tapped; no operation; death.	Sarcoma	*Ovarian Tumours*, p. 56; 1882.
Thornton...	13 years ...	Ovariotomy: recovery.	Dermoid; twisted pedicle.	*Med.-Chir. Trans.*, vol. lxx. p. 65.
Thornton...	14 years ...	Ovariotomy: recovery.	Multilocular cyst..	*Brit. Med. Jour.*, 1878, vol. ii. p. 594.
Bantock ...	14 years ...	Ovariotomy: recovery.	Dermoid	*Med.-Chir. Trans.*, vol. lxiv. p. 124.
Leopold ...	14 years ...	No operation	Sarcoma	*Arch. für Gyn.*, Bd. vi. s. 203.
Spencer Wells.	15 years ...	Ovariotomy: recovery.	Cyst	*Ovarian Tumours*, 1882.
Bantock ...	15 years ...	Ovariotomy: recovery.	Inflamed dermoid; twisted pedicle.	*Med.-Chir. Trans*, vol. lxiv. p. 122.
Lawson Tait.	15 years ...	Ovariotomy: recovery.	Ovarian cyst ...	*Diseases of the Ovary*, p. 319.
Thornton...	15 years ...	Ovariotomy: death.	Described as cancer.	*Med. Times and Gaz.*, Feb. 24th, 1883, p. 211.
R. W. Parker.	Between 14 and 15 years.	Ovariotomy: recovery.	A large multilocular cyst.	Not yet published.
Giraldes ...	15 years ..	Ovariotomy: death.	Dermoid	*Gaz. Heb.*, March 8th, 1867, p. 155.
Dionys von Szabo.	15 years ...	Ovariotomy: death.	Carcinoma... ..	*Arch. für Gyn.*, Bd. xxxii. p. 193.
Dionys von Szabo.	15 years ...	Ovariotomy: recovery.	Dermoid	*Ibid.*
Koeberlé ...	14—15 yrs.	Ovariotomy: recovery.	Dermoid	*Medical Record*, London, Feb. 15th, 1876.
Koeberlé ...	14—15 yrs.	Ovariotomy: recovery.	Dermoid	*Ibid.*
Koeberlé ...	15 years ...	No operation death.	Cancer	*Gaz. Med. de Strasburg*, Sept. 1st, 1875.

An analysis of this table of sixty cases may be arranged thus :—

Dermoids.	Sarcomata.	Cysts.
28	16	16

Brief records of a few other cases were obtained, but the details were too meagre to allow of them being included in the tables.

A study of the various cases included in this list brings to light some important facts. It has long been known that a large proportion of ovarian tumours occurring in infancy are dermoids. The cases in this table

support this opinion, but I was not prepared to find that solid tumours were so frequent.

When considering solid ovarian tumours it was mentioned that they formed in comprehensive lists of ovariotomies about 5 per cent., but my table shows that before puberty solid tumours, described either as *sarcomata* or *carcinomata*, form 26 per cent. of the total number.

But this is not all. Surgeons generally regard an ovarian dermoid as non-malignant. The histories of the patients show that this is not always so. In Jessop's case the report runs thus:—"The tumour consisted of one large cyst, with several smaller ones attached, and of a mass of white cheesy matter, mixed with numerous thin, colourless, curly hairs, which on microscopical examination presented the appearance of encephaloid. At the autopsy cancerous deposits were found in the liver, right supra-renal capsule, and mesenteric glands."

Doran* makes the following important statement:—"Mr. Thornton assures me that he has known several cases where malignant deposits have recurred in the pelvis two or three years after the removal of large dermoid cysts, containing soft white growths that strongly resemble sarcomata."

Thornton† has recorded a case in which he removed an ovarian dermoid from a woman in June, 1881, and she died of recurrence in May, 1882. The details are unfortunately very meagre.

Many cases of ovarian dermoids have been described in which the reporters believed sarcomatous tissue to have been present, but such statements must be received with caution, because the heterogeneous character of these tumours introduces a great element of doubt. Never-

* *Tumours of the Ovary*, p. 89.

† *Med. Times and Gazette*, 1883, vol. ii. p. 235.

theless, it seems to me that the malignant tumours in the ovaries of children—termed by some sarcomata, by others carcinomata—are histologically distinct from the common forms of cancer or sarcoma, and they ought to be arranged provisionally in a group by themselves, under the term *oöphoromata*, because they seem to be special to the connective tissue of the oöphoron. The distinguishing features of *oöphoromata* are these :—

1. Histologically, they repeat the characters of the connective tissue of the *fœtal* ovary.
2. The growth usually affects both ovaries simultaneously, but in a fair proportion of cases is restricted to one ovary.

Fig. 35.—Microscopical Characters of an Alveolar Oöphoroma. (After Doran.)
A, Under low, B, under high, magnification.

3. They rarely occur after puberty.
4. Sometimes they occur in association with ovarian dermoids before puberty, and lead to secondary deposits.
5. They recur locally after removal.
6. In fœtuses and very young children the cell elements preponderate (Fig. 34).

7. Towards puberty they tend to assume an alveolar arrangement (Fig. 35), and mimic the structure of cancer.

It is quite possible that in those oöphoromata which present an alveolar arrangement, the alveoli represent erratic development of immature ovarian follicles.

The subject requires careful investigation, and it would be interesting if those surgeons who have removed ovarian dermoids from children under fifteen years with success, would take the trouble to record the subsequent histories of their patients as far as they have been able to follow them.

It is very instructive to notice, in looking through the tables, that in all the instances where no operation was performed the patients died at intervals of a few months, or one to four years from the time they came under observation.

It is also necessary to point out that in only a few instances have the tumours been submitted to a microscopical examination. An examination of the records of the cases in the table disproves a statement, attributed to Koeberlé, that the majority of tumours in the ovaries of children are either dermoids or cysts originating in the organ of Rosenmüller. I cannot find any trustworthy record of a parovarian cyst before the sixteenth year.

CHAPTER IX.

PAROÖPHORITIC CYSTS AND WARTY OVARIES.

It has already been pointed out that the ovary consists of two distinct parts: the *oöphoron* and *paroöphoron*. The latter contains remnants of the *mesonephros* (Wolffian body) in various stages of degeneration. Usually, the paroöphoron in the adult consists of fibrous tissue permeated by blood-vessels, and receives the vertical tubules of the parovarium. In the fœtus at birth, and occasionally in young subjects, it retains, in a measure, its original tubular character. In such specimens the structural differences of the two parts of the ovary are very striking.

The cysts which arise in the paroöphoron are, as a rule, unilocular, and differ from oöphoritic cysts in the following particulars:—

1. They do not affect the shape of the ovary until they have attained an important size.
2. They always burrow between the layers of the mesosalpinx, and when large make their way between the layers of the broad ligament by the side of the uterus.
3. The interior is beset with warts.

The warts in such cysts vary greatly in number. Sometimes only a few clusters are present, as in Fig. 36, but in others they are so luxuriant as to cause the cyst containing them to rupture (Figs. 37 and 38).

These warts are very vascular, bleed freely when handled, and are frequently calcified.

Coblenz * was the first to clearly identify and distinguish these cysts from those arising in the parovarium, and associate them with definite structures. His observations have been largely confirmed by Doran,† who has devoted great attention to this question.

On one occasion, whilst examining sections of the

Fig. 36.—Paroöphoritic Cyst. (After Doran.)
Its relations to the tube, ovary, and meso-salpinx are well shown.

ovaries of a seventh-month fœtus, Doran detected in one of them three small cysts, almost of equal size, lying in a row along its long axis, and plainly visible to the naked eye, which could also detect exuberant vegetations growing from their walls. The cysts were almost perfectly spherical; the largest measured one-twelfth, and the smallest one-sixteenth, of an inch in diameter. When these cysts were examined under the microscope the

* Virchow's *Archiv*, Bd. lxxxiv. p. 26.
† *Trans. Path. Soc.*, vol. xxxii. p. 147.

branched processes sprouting into the cysts were seen to be covered with columnar epithelium, these processes were, in structure, warts. After a careful and detailed description of these ovaries, Doran came to the reasonable conclusion that the small cavities were incipient papillomatous cysts of the paroöphoron.

The original description of this important specimen is illustrated by a photograph of one of the sections.

In 1886 I examined, microscopically, a large number of ovaries obtained from human fœtuses, and on one occasion found a cyst somewhat smaller, but identical in its situation and characters with those described by Doran.

The distinguishing feature of these paroöphoritic cysts is that they contain *papillomata; but all papillomatous cysts of the ovary are not paroöphoritic in origin.* It will therefore be convenient in this chapter to consider the subject of warts in relation to the ovary and paroöphoritic cysts. The number of warts in such cysts varies very considerably: in the specimen represented in Fig. 36 it contains one large tuft surrounded by a few scattered nodules, whereas in other examples the cavity of the cyst may be so stuffed with them that it bursts.

The museum of the Royal College of Surgeons, London, contains an admirable specimen illustrating this. It is sketched in Figs. 37 and 38. It is thus described in the catalogue:—"An uterus with its appendages. A mass of finely lobulated and pedunculated growths springs from the site of each ovary, the substance of which, with follicles, was discovered on close search at the roots of the growths. These growths were probably enclosed at an early stage in a cyst wall."

The parts were removed, after death, from the body of a young lady who died of some visceral affection.

It is a matter of regret that more facts are not

forthcoming regarding the clinical signs. There can be no doubt that the opinion expressed in the catalogue that

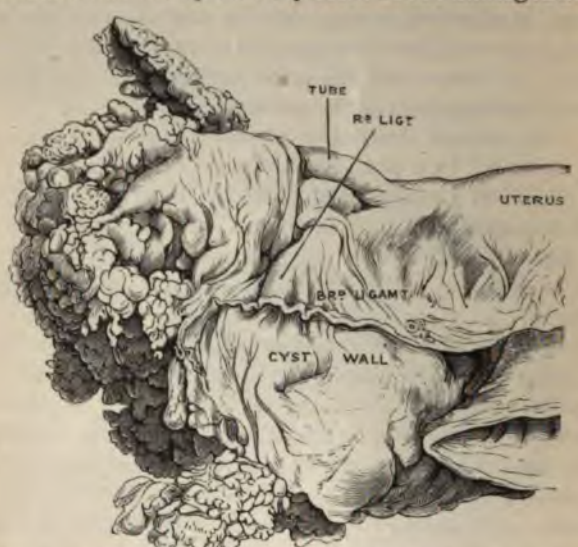

Fig. 37.—Ruptured Paroöphoritic Cyst (right half of the specimen). (Museum, Royal College of Surgeons.)

the growths were probably enclosed, at an early stage, in a cyst, is correct, for the following reasons:—

1. The characters of the papillomatous masses exactly correspond to those found in paroöphoritic cysts.
2. The ovary is partially absorbed by the growth.
3. The mass has burrowed between the layers of the broad ligament, and made its way beside the uterus.
4. Remnants of the cyst wall are still present in the specimen.

A distinction must be drawn between rupture of the cyst and perforation of the cyst wall by the papillomata.

In the latter condition, cauliflower-like masses of warts project from the surface of the cyst into the peritoneal cavity : sometimes at one spot, sometimes in three or four places. In the specimen mentioned above the

Fig. 38.—Ruptured Paroöphoritic Cyst (left half of the specimen). (Museum, Royal College of Surgeons.)

cysts have ruptured, for it will be seen, on reference to Fig. 37, that the parts have been beautifully prepared and dissected, and that the anterior layer of the broad ligament is sharply indicated; below this the true cyst wall, with the delicate texture so frequently displayed by these cysts, is easily recognised on the right side.

The papillomata in these cysts, when they form such large dendritic masses, are very vascular, and easily bleed when manipulated. The cells are usually spheroidal in shape, and the stroma is very scanty. Frequently the warty masses undergo calcification.

An important pathological and clinical fact connected

with these cysts is, that when they rupture the fluid they contain is scattered broadcast over the peritoneum. Doran * briefly relates a case of this kind :—

"The patient was forty-six years of age; the cyst had burst, and the bladder, uterus, and pelvic peritoneum were studded with papillary growths. The cyst had forced itself between the layers of the broad ligament, and grown backwards, pushing itself under the peritoneum, until at one point its walls touched the common iliac arteries. It was mostly enucleated. The patient died on the fifth day. There was thrombosis of the right femoral vein, which accounted for a swollen state of the right lower extremity before the operation. The papillomatous deposits had reached the peritoneal lining of the diaphragm."

This case, though briefly recorded, not only indicates the risks which patients run from the rupture of such cysts inducing general infection of the peritoneum, but also the difficulties which beset the operation when they are of large size and burrow deeply and extensively under the pelvic peritoneum.

When there is general papillomatous infection of the peritoneum, the warts are most numerous on the serous membrane lining the recto-vaginal pouch, and on the omentum and mesentery.

When paroöphoritic cysts are of moderate size and have not burrowed deeply, the broad ligament and tube will form a pedicle, which may be ligatured as easily as in parovarian cysts.

The papillomatous infection of the peritoneum when these cysts burst is also interesting. It has been clearly established that when the abdomen has been opened for

* *Clinical and Pathological Observations on Tumours of the Ovaries*, p. 70.

the removal of a papillomatous cyst, the peritoneum has been found studded with warts. A few years later the abdomen has been re-opened, and all the peritoneal warts have disappeared. Thus they behave like warts on the skin. This fact must be borne in mind, or the operator will hastily assume the disease to be malignant when he finds general peritoneal infection.

An analysis of trustworthy lists of ovariotomy cases

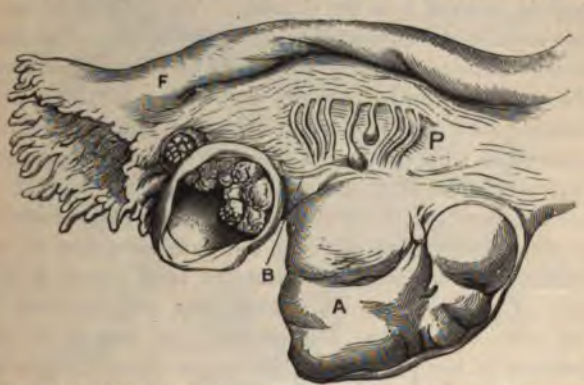

Fig. 39.—Papillary Cyst growing between the Layers of the broad Ligament, near the Tubo-ovarian Ligament. (*Brit. Gyn. Soc.*)
A, Ovary; P, parovarium; B, pedicle of the cyst; F, Fallopian tube.

shows that papillomatous paroöphoritic cysts are rare before the twenty-fifth year; the period of life in which they are most frequent is between the twenty-fifth and fiftieth years.

Peritoneal infection may ensue when such cysts are tapped, if any of the fluid escape into the abdominal cavity. Tapping is therefore inimical to the patient.

Papillomatous cysts arising in the paroöphoron are sometimes associated with dermoids, and even sarcomata of the ovary.

There is a form of papillomatous cyst which arises

in connection with the ovary, unconnected with the paroöphoron.

The first specimen which came under my notice is represented in Fig. 39. The ovary, parovarium, and Fallopian tube are quite normal. Growing between the layers of the mesosalpinx, quite close to the tubo-ovarian ligament, is a small cyst containing two separate loculi. The cyst wall is attached to the ovary by a narrow pedicle, marked B in the drawing. The interior of each cyst contained some small cauliflower-like tufts of papillomata. The bases of these warty tufts were formed of dense fibrous tissue, and the warts themselves felt hard and resisting, like cartilage. The cysts did not arise in the parovarium; the tubules of this structure were dissected, as shown in the sketch, and found to be quite distinct.

A second specimen which came into my possession is of some interest as showing the care necessary to be exercised in deciding the nature of cysts found in this part of the mesosalpinx. The parts are sketched in Fig. 40. Occupying the mesosalpinx, exactly in the position of the parovarium, was a cyst about the size of a cherry. On superficial examination it appeared like an incipient parovarian cyst. On cutting into it a tuft of warts of almost cartilaginous hardness was found in its interior, and the fluid which escaped from it was like milk in colour. This led to a very careful examination of the parts, and dissection showed that the cyst was unconnected with the parovarian tubules. If we could trust to the presence of warts alone it would be reasonable to infer that this cyst was an ordinary paroöphoritic cyst in an incipient stage, but on examining the surface of the ovary opposite to the paroöphoron there was a second cyst scarcely larger than a pea. On opening this, the same milky fluid escaped, and a tiny tuft of warts jutted into its cavity.

Among my collection of specimens at the Middlesex Hospital illustrating this branch of pathology there is an ovary enlarged in consequence of cysts to twice its natural size. The cysts are of two varieties; the larger occupy the substance of the ovary, but the smaller are

Fig. 40.—Warty (not Paroöphoritic) Cysts of the Ovary. Natural size.

situated immediately beneath, and project the serous coat. Both varieties of cyst contain the small hard white warts such as existed in the specimen from which Figs. 39 and 40 were drawn. In some parts of the ovary the warts projected freely from the surface, but it was easy to show that the papillomata had been originally enclosed in cysts, because around some of the exposed masses remnants of the cyst wall were detected.

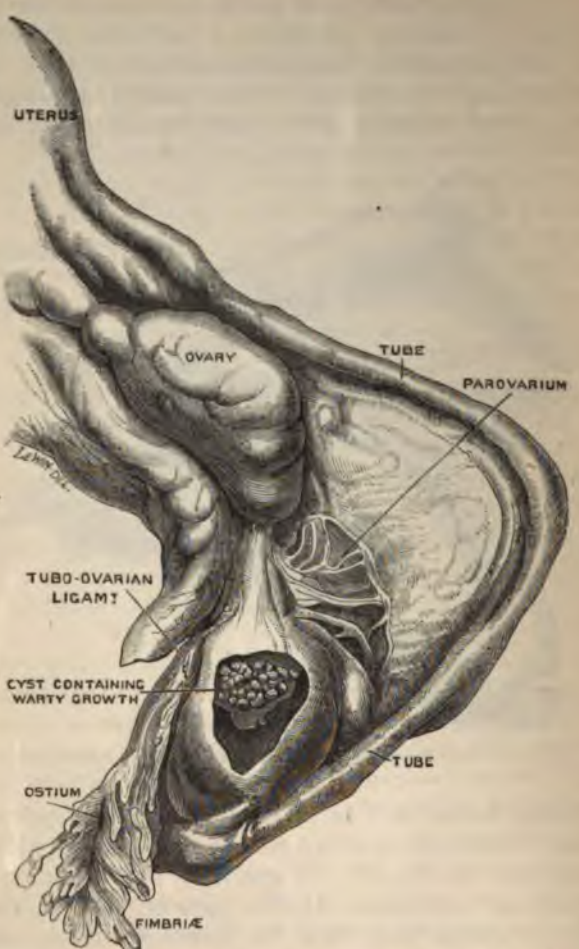

Fig. 41.—Warty Cyst, burrowing between the layers of the Mesosalpinx along the Tubo-ovarian Ligament. Natural size.
The tube is 17 c.m. in length.

It is necessary to mention that three out of five of my specimens of warty ovaries were removed from patients with large uterine myomata.

Papillomatous cysts of this kind differ from paroöphoritic cysts in the following manner :—

1. They are usually multiple.
2. The cysts occur in any portion of the ovary.
3. The warts are of almost cartilaginous hardness.
4. There is no evidence that such cysts ever attain sufficient size to render them dangerous to life.
5. Such cysts are frequently associated with uterine myomata.

Another curious feature of warty cysts springing from the neighbourhood of the parovarium is that they exhibit a great tendency to burrow between the layers of the mesosalpinx along the tubo-ovarian ligament, quite away from the parovarium. This is indicated in Figs. 39 and 40, but is better seen in Fig. 41. When fresh, these cysts are sometimes translucent, and it is impossible to be sure of the presence or absence of warts without opening them.

When the cysts are as large as in the specimen sketched above, the Fallopian tube is usually much elongated. This stretching is probably due to the tension exerted by the cyst swinging at the distal end of the tube.

Literature of Paroöphoritic Cysts.—Thornton : *Trans. Path. Soc.*, vol. xxviii. p. 189 ; Coblenz : Virchow's *Archiv*, Bd. lxxxiv. s. 26 ; Tait : *Diseases of Ovaries*, p. 147, 1883; Doran : *Tumours of the Ovaries*, 1884, and *Trans. Path. Soc.*, vols. xxxii. p. 147, and xxxiii. p. 207.

CHAPTER X.

PAROVARIAN CYSTS.

THE parovarium consists of a series of narrow tubules situated between the layers of the mesosalpinx, and closely associated with the paroöphoron. It is easily seen, when the mesosalpinx is stretched and held between the eye and the light, as a series of tubules radiating from the ovary to join a longitudinal tubule situated at a right angle to them. Although the tubules converge as they approach the ovary, nevertheless they remain distinct. Each tubule ends blindly, and is usually lined with epithelium. In form, size, and disposition they resemble the arrangement of the vasa efferentia of the testis. This resemblance was observed by Rosenmüller, who discovered this structure in 1801 whilst prosecuting anatomical researches at Erlangen. The parovarium is homologous with the vasa efferentia and epididymis of the testis, for these tubular structures in the male and female are the persistent excretory ducts of the Wolffian body (mesonephros). In the female they are vestigial, whereas in the male they are functional.

When present in its typical condition, the parovarium consists of three parts (Fig. 42): an outer series of tubules, free at one extremity, known as Kobelt's tubes; an inner set, termed the vertical tubules. The parovarium contains, as a rule, twelve tubules; sometimes as many as seventeen may be counted, and in other specimens as few as five. Lastly, there is a larger tube running at right angles to the vertical tubules which may

occasionally be traced downwards to the vagina. This is Gartner's duct; it corresponds to the vas deferens in the male.

The cysts that arise in the parovarium are of two kinds. The most frequent are small pedunculated cysts connected with Kobelt's tubes. As they rarely exceed a

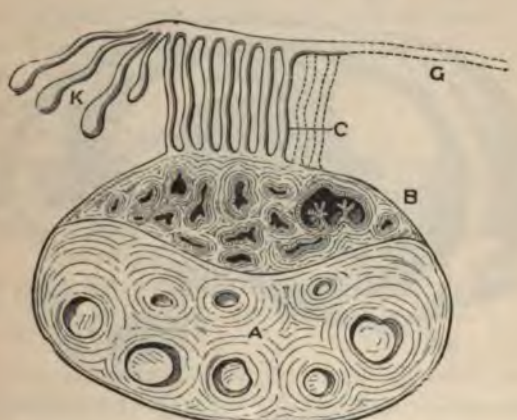

Fig. 42.—The Parovarium (semi-diagrammatic).
A, Oöphoron; B, paroöphoron; K, Kobelt's tubes; C, vertical tubes of the parovarium; G, Gartner's duct.

pea in size, they do not call for much comment, as they are of no clinical importance. They need to be mentioned, however, because they are often confounded with the hydatid of Morgagni. The distinction between the two structures is given on page 229. Occasionally some of the vertical tubules will break loose and form pedunculated cysts. Should the cyst rupture, it may be converted into a tuft of fimbriæ. The most important cysts are sessile, and remain between the layers of the mesosalpinx. In the early stages it is easy to demonstrate

the relation of these cysts to the parovarium. When such a cyst enlarges it burrows between the layers of the mesosalpinx and makes its way towards the Fallopian tube, which becomes stretched, because the abdominal end of the tube is fastened firmly to the ovary by the tubo-ovarian ligament, and the ovary in its turn is attached

Fig. 43.—A Cyst of the Parovarium, showing its relation to Ovary and Tube. Two-thirds its natural size.

A, Oöphoron; B, paroöphoron; F, Fallopian tube.

to the side of the uterus. In a very large cyst the Fallopian tube becomes greatly elongated; I have known it to attain a length of 40 c.m. In spite of this extreme stretching, the lumen of the tube is rarely obstructed, and its abdominal ostium can usually be found, the fimbriæ being indicated by a few wattle-like processes (Fig. 43).

Small cysts are, as a rule, transparent, but when they exceed the size of a cocoa-nut this transparency is lost, and the walls become thick and tough. Small parovarian cysts are lined with columnar epithelium, which is sometimes ciliated; in cysts of moderate size

the epithelium becomes stratified, and in large cysts it atrophies from pressure.

The fluid they contain is clear and limpid; specific gravity 1010, reaction slightly alkaline. An albuminous substance, precipitated by nitric acid and by alcohol, is present in large quantity.

The points which enable a large parovarian cyst to be distinguished from an oöphoritic cyst are these:—

1. The peritoneal coat is easily stripped off.
2. The ovary is usually found attached to the side of the cyst.
3. The cyst is usually unilocular.
4. The Fallopian tube is stretched over the cyst, and never communicates with it.
5. Specific gravity of the fluid does not exceed 1010, and may be much lower.
6. In some specimens the tissue of the mesosalpinx stretched by the tumour becomes greatly thickened.

It was formerly believed that cysts originating in the parovarium rarely exceeded the size of an orange, but in 1873 Dr. Bantock* demonstrated beyond any doubt that parovarian cysts may attain very large proportions, and be capable of containing several pints of fluid. The chief rules laid down by Dr. Bantock to serve for the recognition of parovarian cysts are those given above. The conclusions arrived at by this surgeon have been confirmed by subsequent investigators; and there can be no doubt that in the lists of the early ovariotomists many of the so-called unilocular cysts of the ovary were parovarian in origin. My own observations on recent and old museum specimens serve to convince me

* "On the Pathology of certain so-called Unilocular Ovarian Cysts," in *Trans. Obstet. Soc., London*, vol. xv. p. 105.

of this fact, and of the correctness of Dr. Bantock's conclusions.

The age at which parovarian cysts occur is of some interest. It has already been mentioned that oöphoritic cysts are encountered at any period of life, from fœtal life up to extreme old age. The occurrence of a parovarian cyst has not, as far as I am aware, been recorded in an individual before the age of sixteen. I have collected many undoubted cases at seventeen, eighteen, and nineteen, in which the cysts were large enough to be detected above the pubes. Before sixteen the parovarium appears to be quiescent, but on the advent of puberty it seems to undergo great stimulation. A very large proportion of cysts, generically classed as ovarian, removed between the ages of seventeen and twenty-five, arise in this interesting structure.

It is difficult to come to any satisfactory conclusion as to the relative frequency of parovarian, as compared with paroöphoritic and oöphoritic cysts, until operators become less casual in their use of the term ovarian cyst. With our present knowledge, they form about ten per cent.

Parovarian cysts do not often contract adhesions, even when of large size. The layers of the broad ligament stretched over them occasionally contain an unusually large proportion of unstriped muscle-fibre. Parovarian cysts rarely suppurate, even when tapped, and as this procedure cannot be depended upon to cure them, it is now abandoned as unsatisfactory, apart from its risks. Like other forms of cysts and tumours related to the ovary, they are liable to axial rotation and complete detachment. An example of this is illustrated in Fig. 44.

The parts were removed by Dr. Walter, of Manchester, and he kindly placed them in my hands for

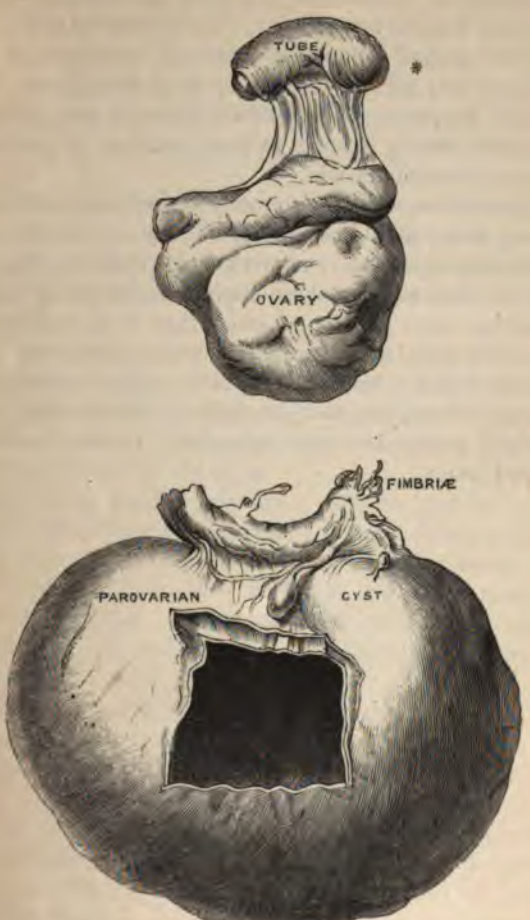

Fig. 44.—Ovary and Stump of a Fallopian Tube, left after axial rotation, ending in complete detachment of a Parovarian Cyst. (Dr. Walter's case.)

* The rounded stump of the tube at the point of detachment.

examination. The cyst is clearly parovarian, and is embedded in the mesosalpinx. The fimbriated end of the tube and a small pedunculated cyst are connected with it. The cyst was adherent to the back of the uterus. The veins in the corresponding broad ligament were varicose. For fuller details relating to axial rotation of cysts and tumours, *see* chapter xiii.

Epithelium.—It was formerly the custom to believe in the immutability of epithelium; hence many writers have relied upon the characters of the epithelial lining of cysts as indicative of their origin. Mutation of epithelium has been proved so often, that it is needless to do more than mention that in some parovarian cysts ciliated cells will be found: in other simple cubical, and in many large cysts, no epithelium can be detected. Undoubted parovarian cysts sometimes present low flat-topped warts.

CHAPTER XI.

OVARIAN HYDROCELE.

In 1853 Richard described, under the term tubo-ovarian cyst, a variety in which the Fallopian tube opened directly into the cavity of a cyst by a large circular or elliptical aperture, representing the abdominal orifice of the tube.

Tubo-ovarian cysts have been described several times since Richard drew attention to them. These descriptions have been collected and analysed by Dr. Griffith. None of the observers appear to have appreciated the nature of these curious cysts.

It will be more appropriate to call them *ovarian hydroceles*, because there is good reason to believe that they arise in a tunic of peritoneum that occasionally invests the ovary, much in the same way that the tunica vaginalis clothes the testis. Before submitting evidence in support of this view, it will be well to describe a few typical specimens.

A good example is sketched in Fig. 45 : the cyst was removed from a woman forty-three years of age. She had noticed a swelling in her abdomen for three years. Clinically it presented the characters of a cyst occupying the broad ligament. At the operation it was found intimately incorporated with the broad ligament, and this caused some difficulty. It contained three pints of straw-coloured fluid.

On dissecting the specimen, the Fallopian tube was found dilated and contorted; its distal end communicated with the interior of the cyst by an oval aperture.

On examining the walls of the cyst microscopically, no epithelium was detected. The orifice by which the tube and cyst communicate corresponds to the abdominal

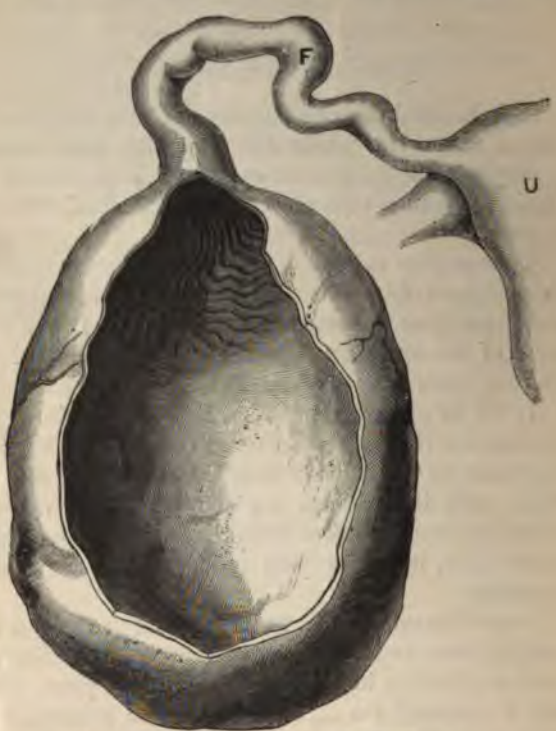

Fig. 45.—Ovarian Hydrocele. (*Trans. Obstet. Soc.*)
F, Fallopian tube; U, uterus.

ostium of the tube, and the ridges which radiate therefrom were directly continuous with the folds of mucous membrane within the tube. In this specimen no trace of the ovary was visible. The nature of this form of cyst

is more clearly set forth in the specimen shown in Fig. 46. This came into my hands in a recent condition, and on reference to the sketch it will be noticed that the tube is widely dilated toward its ampulla, and then opens by a wide orifice into an oval cyst the size of an

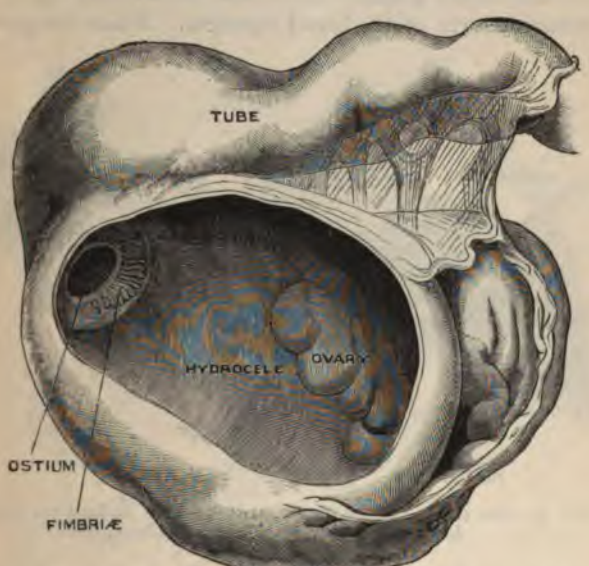

Fig. 46.—Ovarian Hydrocele. Natural size. (Dr. Walter's specimen.)

egg. Projecting into the floor of the cyst is a portion of the ovary; the remainder of the ovary, though adherent to the cyst wall, lies outside the cyst, and presents a recent corpus luteum.

The cyst wall was directly continuous with the broad ligament. On examining the orifice by means of which the tube and cyst communicated, small atrophied, but unmistakable, Fallopian fimbriæ were found. The

examination of this specimen threw much new light on the subject.

We must, in order to appreciate these cysts, deal with a few points relating to the peritoneal relations of the ovary.

The ovary projects from, and is invested by, the posterior layer of the broad ligament. When the parts

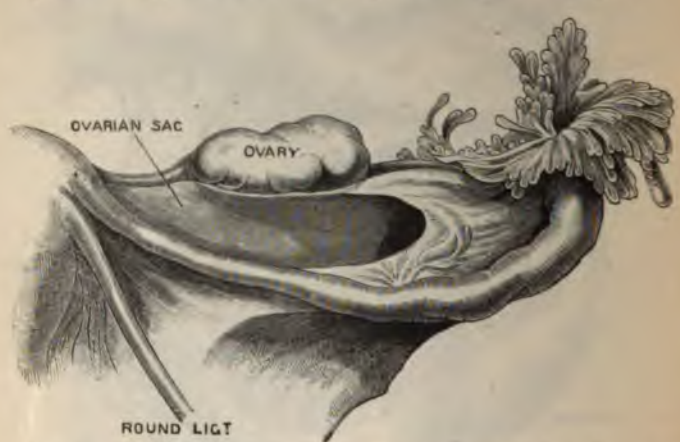

Fig. 47.—The Ovarian Sac or Recess on the posterior aspect of the Broad Ligament (human). (Modified from Richard.)

are examined *in situ*, the ovary will be found to lie in, or upon, the edge of a shallow recess in the mesosalpinx. This recess is the ovarian sac. It varies in depth: in many it is small and inconspicuous, whilst in others it is sufficiently deep to accommodate the entire ovary. In the virgin the ampulla of the tube falls over the mouth of this recess and conceals the ovary. This relation of parts is usually disturbed in the first pregnancy. The position of this pouch is shown in Fig. 47, which is slightly modified from the well-known figure introduced

by Richard, 1851. In this drawing the parts are represented as seen from the front, the tube and mesosalpinx being drawn forward in order to put the parts on the stretch.

In many mammals the ovarian sac is much deeper than in the human female. In such a mammal as the

Fig. 48.—Transverse Section of the Ovary and Ovarian Sac of a Mouse. (After Robinson.)

hyæna (*Hyæna crocuta*) it forms a complete tunic to the ovary, and the cavity of the sac communicates with the general peritoneal cavity by a very small fringed orifice. In rats and mice the sac is complete, so that the ovary is isolated from the general peritoneal cavity. As the Fallopian tube opens into the ovarian sac, it follows that in such forms as the hyæna, or the tigress, the tube opens into the peritoneal cavity by way of the ovarian sac. In rats and mice the Fallopian tubes communicate

with the ovarian sacs, but not with the general peritoneal cavity.

The sac in some mammals invests the ovary loosely, whilst in others, as the raccoon, it fits it tightly, and corresponds with its eminences and depressions. These ovarian sacs, with the exception of the complete form exhibited by rats and mice, have long been known to

Fig. 49.—Ovarian Sac of a Baboon. (After Robinson.)

anatomists, but it remained for Mr. Arthur Robinson not only to detect the complete form, but to demonstrate the manner in which they arise.

Stages in the formation of these sacs, intermediate to the shallow recess in the human female and the complete pouch of the mouse, may be studied in the baboon and porcupine (Figs. 49 and 50).

An examination of the sac in the porcupine shows that when the ovary lies in the recess, the margins of the cavity come into contact; in the figure they are represented widely separate, in order to display the

relation of the parts. Should the edges unite, then a complete sac, such as is represented in Fig. 48, would be formed. For full details reference should be made to Robinson's admirable paper.* When the ovary is furnished with a complete sac of this kind it resembles the testis, with its tunica vaginalis, except that the Fallopian tube directly communicates with it.

Lawson Tait † writes :—"In a few exceptions I have

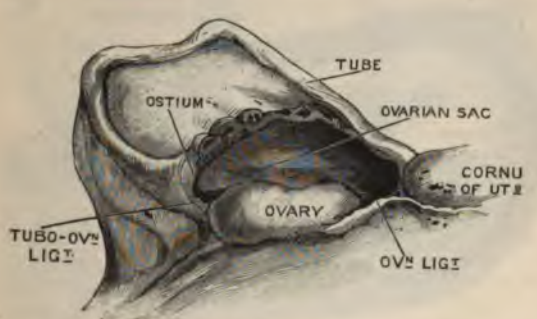

Fig. 50.—Ovarian Sac of a Porcupine. (After Robinson.)

seen a crescentic double fold of the posterior layer of the broad ligament pass down behind the ovary, covering it like the hood of a 'Nepenthes' gland. In all such cases the women have been sterile, probably because this hood has prevented the application to the ovary of the opening of the oviduct. I have seen this arrangement give great trouble in the removal of small ovaries."

Being acquainted with the existence of ovarian sacs, I have been on the watch for several years for

* "On the Peritoneal Relations of the Mammalian Ovary;" *Journal of Anatomy and Physiology*, vol. xxi. p. 169.

† *Diseases of the Ovaries*, p. 6; 1883.

specimens in which they had become converted into hydroceles.

Schneidemühl* has described and figured a specimen which he found in a mare (Fig. 51).

Dr. Robinson kindly placed at my disposal two specimens, obtained from white rats, in which the ovarian sacs were distended with pus.

The museum of University College, London, contains

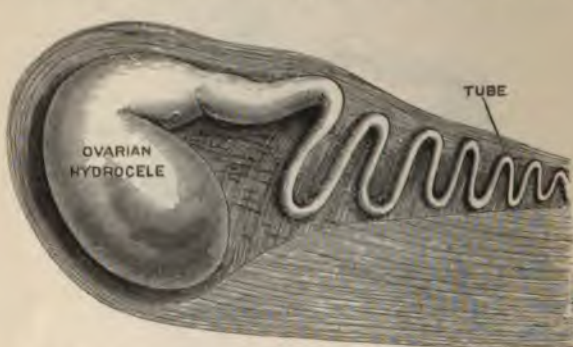

Fig. 51.—Ovarian Hydrocele from a Mare. (After Schneidemühl.)

a specimen formerly described as an example of double ovarian cysts in a guinea-pig. As the peritoneal relations of the ovaries in this rodent are identical with those of the porcupine, I suspected that these supposed ovarian cysts were probably hydroceles; on dissecting the parts, with the kind permission of Mr. Stonham, it was easy to determine that the cysts were largely dilated ovarian pouches, and the Fallopian tubes ran round them, the abdominal ends being directly continuous with the sac wall. In the smaller tumour the Fallopian tube dilates as it approaches the abdominal end, and opens by its

* *Zeitschrift für Thiermedecin*, Bd. ix. s. 279.

ostium into the sac. In the larger cyst the orifice is obliterated. The ovaries on both sides are cystic, and project into the sacs of the hydroceles with which they are associated (Fig. 52).

During life the guinea-pig was thought to be pregnant;

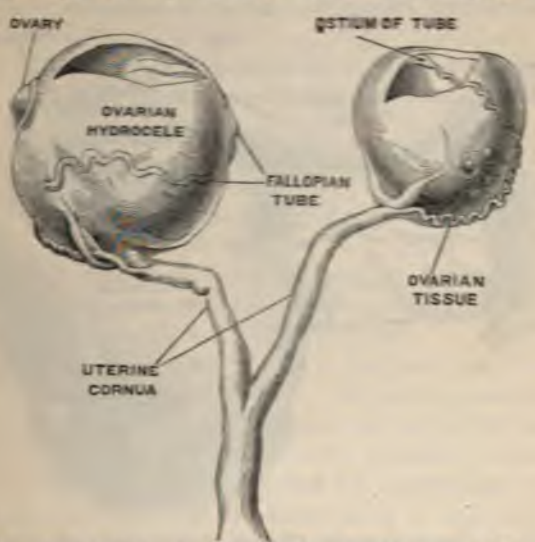

Fig. 52.—Ovarian Hydroceles in a Guinea-pig. (Museum of University College.)

it died with convulsions resembling those seen in uræmia.

An excellent specimen of ovarian hydrocele is preserved in the museum of St. Bartholomew's Hospital. It has been described by Dr. Griffith* as a tubo-ovarian cyst, but from his account of the specimen I came to the opinion that it was a hydrocele, and obtained permission to re-examine it.

* "Tubo-Ovarian Cysts;" *Trans. of the Obstetrical Society*, vol. xxix. p. 273; 1887.

The uterus and the left ovary and tube are normal. Projecting from the back of the right broad ligament is a thin-walled unilocular cyst, measuring five inches by three and a half inches. The ovarian ligament passes from the uterus to the cyst wall, and at this spot ovarian tissue

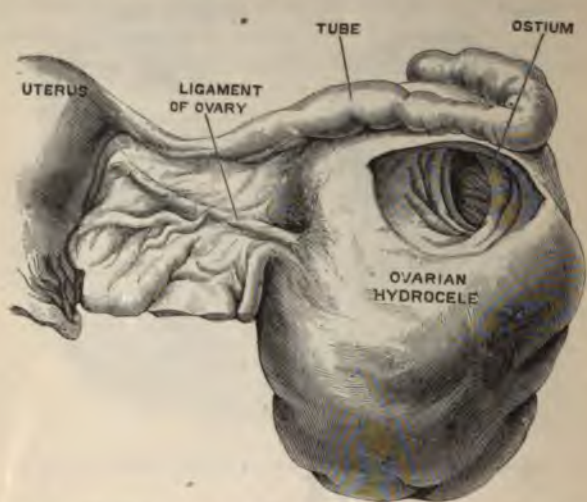

Fig. 53.—Ovarian Hydrocele. (Museum, St. Bartholomew's Hospital.)

can readily be seen, as Dr. Griffith points out in his original account of the case. The Fallopian tube measures nine inches in length; its outer third is greatly distended, but the inner two-thirds are not enlarged. The abdominal extremity is adherent to the cyst, and communicates with it by a large circular opening two inches in diameter. No traces of the fimbriæ are visible on the inner or outer surfaces of the cyst (Fig. 53).

The contents of the cyst were unfortunately lost, but the fluid was thin, watery, and almost colourless. The

specimen has no clinical history, and was removed at the *post mortem* examination of a woman twenty-seven years of age, who died three years and a half after a severe injury to the spine, causing paraplegia. There is no history as to the duration of the cyst.

The peculiarities of ovarian hydroceles may be summarised thus :—

1. The Fallopian tube opens by its abdominal ostium into a sac on the posterior aspect of the broad ligament.
2. The tube is elongated, dilated and tortuous, and, as Griffith aptly expresses it, the general outline of the parts resembles "*a retort with a convoluted delivery tube.*"
3. As a rule, there is no evidence of inflammation. The cyst may suppurate should the tube become affected with salpingitis.
4. In small cysts the ovary will be found projecting on the floor of the sac. In larger specimens it will be incorporated with the wall of the sac, and in very large specimens is unrecognisable.

Ovarian hydroceles must not be confounded with tubo-ovarian cysts; on the other hand, a suppurating ovarian hydrocele must not be confounded with a tubo-ovarian abscess.

Intermitting ovarian hydrocele (*hydrops tubæ profluens*).—An ovarian hydrocele differs from hydro- or pyo-salpinx in the fact that it may intermit: that is, the fluid which it contains sometimes escapes through the tube into the uterus, and is discharged externally. Dr. Barnes mentions a case of this sort which occurred to Mr. Anderson. A woman with an abdominal cyst, waiting to be tapped, suddenly passed what was supposed to be an excessive quantity of urine. The fluid was found to be albuminous, and contained cholesterine. Six months

later she died from hæmoptysis, and a large empty cyst, with secondary cysts in its walls, was found in the abdomen. A good-sized staff passed easily through the tube into the uterus.*

Intermitting ovarian hydroceles are very rare.

Ovarian hydroceles and tubal pregnancy.—These two conditions have an interesting relation to each other. It is discussed in chapter xxix.

Literature.—Richard: *Memoires de la Société de Chirurgie de Paris*, vol. iii. p. 121, 1853; Griffith: "Tubo-Ovarian Cysts"; *Trans. Obstet. Soc., London*, vol. xxix. p. 273.

* *Diseases of Women*, p. 324; 1873.

CHAPTER XII.

SECONDARY CHANGES IN OVARIAN TUMOURS. INFLAMMATION, SUPPURATION, AND ADHESIONS.

OVARIAN tumours are liable to secondary changes, several of which are important clinically, as they endanger the life of the patient. The chief of these are :—

Inflammation and suppuration.
Axial rotation.
Rupture of the cyst.

This chapter will be devoted to the consideration of the changes induced by inflammation of the cyst.

All who have performed, or assisted at, the operation of ovariotomy must have been struck by the fact that at times a large cyst holding two or more gallons of fluid will be withdrawn, its external surface being smooth and glistening like the healthy peritoneum, whilst in another and much smaller specimen the cyst walls are adherent to almost every organ in the neighbourhood, so that when its removal is at last accomplished the surface of the cyst is covered with villous tufts of new tissue, and resembles in outward appearance the shaggy sides of a Skye terrier. Such adhesions arise from the organisation of inflammatory exudation.

The tissues of ovarian tumours may inflame from several causes : at first glance it seems somewhat difficult to understand how ovarian cysts should become inflamed, enclosed as they are in air-tight cavities, and having no communication with other organs. A little reflection soon reveals several sources of infection ; of these the

principal are:—The intestinal canal, the urinary bladder, the Fallopian tube, and in some cases the accidental admission of air by tapping.

Speaking generally, it is not the large cysts which rise up out of the pelvis and occupy the greater part of the abdomen that become inflamed to any serious extent, but tumours of moderate size, which remain wedged in the pelvis, and especially cysts with dermoid contents.

The chief channel by which infection gains access to these cysts is the *Fallopian tube*. The part played by this duct in producing inflammation of the ovary and pelvic peritoneum has been adequately recognised by many in recent years, but no writer has thought fit to discuss its relation to inflammation of ovarian tumours, yet every surgeon of experience will agree in the opinion that of all adhesions encountered in ovariotomy, the densest and most difficult are those which occupy the pelvis.

Again, the opinion that the Fallopian tube is the channel by which the infecting material gains access to the walls of the tumour is not a matter of inference, but of direct observation, for an examination of such tumours will often reveal the fact that the adhesions are most abundant in the immediate neighbourhood of the ostium of the tube; and an examination of the tube will bring to light evidence of existing, recent, or past salpingitis. My attention was more particularly directed to this matter by the following case:—

A woman forty years of age, who had been married many years, but had never been pregnant, came under my care with symptoms of pelvic tumour. For several years she had suffered from a vaginal discharge. On examination, the cervix of the uterus was found so long as to protrude at the genital orifice, and there was no

difficulty in recognising a tumour somewhat larger than an orange occupying the recto-vaginal pouch. This tumour was very tender. Rest and palliative treatment led to no improvement, and in due course abdominal section was performed. At the operation a dermoid cyst as big as an orange was found replacing the right

Fig. 54.—Ovarian Dermoid and Pyosalpinx. One-third natural size. The tumour was fixed by dense adhesions.

ovary; it was intimately adherent to the broad ligament and pelvic peritoneum; the Fallopian tube was converted into a large pyosalpinx, and bound to the tumour by tough adhesions (Fig. 54). On slitting up the tube its walls were found to be lined by velvety granulation tissue. The left Fallopian tube was converted into a retention cyst as big as a ripe fig.

Since making the above observation, many specimens have come under my notice in which by dissection and

microscopical examination I have been able to demonstrate the co-existence of sub-acute or chronic salpingitis and adherent ovarian cysts, especially dermoids. An adherent ovarian cyst associated with salpingitis is sketched in Fig. 55.

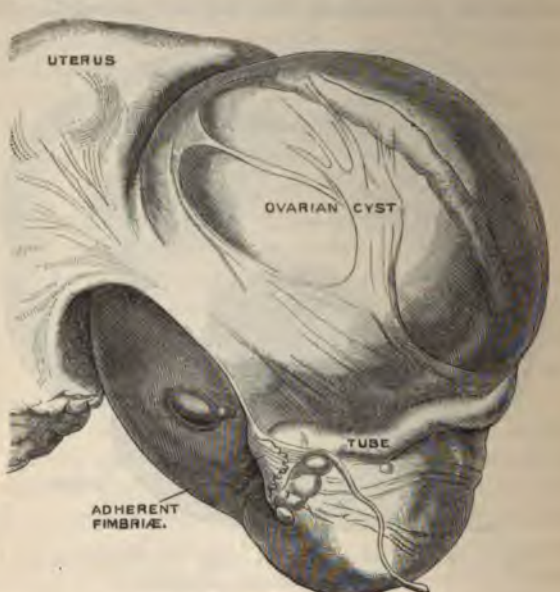

Fig. 55.—Small adherent Ovarian Cyst.
The tube presented good evidence of chronic salpingitis.

Valuable evidence in support of the relation between salpingitis and pelvic adhesions of ovarian tumours is furnished in a paper published by Thornton, entitled "Three Hundred Additional Cases of Ovariotomy." On examining the meagre details of each case, I find that in one hundred and two cases (between 274 and 376 in the list) there are eight instances in which hydrosalpinx was

found on the side opposite to the cyst, and in two patients hydrosalpinx existed on each side. In all the cases but one in which hydrosalpinx was present, there were dense adhesions, especially in the pelvis.*

Inflammation of the cyst wall, set up by infection conveyed through the Fallopian tube, is not always restricted to the immediate neighbourhood of the tube, but may extend over the cyst, and lead to adhesions between it and the omentum, intestines, and parietal peritoneum.

On the other hand, the *intestines* may be the source of infection. For instance, a portion of the small intestine or the rectum may become adherent to the cyst wall, in consequence of inflammatory changes arising in the gut itself. The adherent piece of intestine becomes pressed upon by the tumour, the wall of the gut thins, and allows the intestinal gases to diffuse, and cause suppuration. Occasionally the walls of the cyst become so thin that the gas enters the cavity of the cyst, sets up putrefaction, and converts it into a huge abscess; not rarely communication becomes established between the intestine and the interior of the cyst, whereby its contents escape. This condition is discussed in detail in chapter xiv.

An important mode in which inflammation of the wall of an ovarian cyst is initiated is by appendicitis.

More than one surgeon has noticed that the *vermiform appendix* has been fixed to the walls of a cyst by firm adhesions, but no one, so far as I know, has urged that the appendix in many of these was the source of the inflammation which led to the adhesions.

Doran, in his admirable observations on tumours of the ovary, has given brief descriptions of six cases in which he detected adhesions of the vermiform appendix

* *Medico-Chir. Trans.*, vol. xx. p. 41.

to the walls of an ovarian cyst. He writes that "adhesion of the vermiform appendix appears almost invariably associated with extensive adhesions between the tumour and other abdominal structures," and mentions a case which occurred in a woman, aged thirty-five years, operated upon for ovarian cyst. The adhesions were so universal, and the structures adjacent to the tumour so altered by pathological changes, that the true nature of the patient's disease could not be determined until after death. On *post mortem* examination a fused double ovarian cyst was recognised. The appendix was six inches in length, and strongly adherent to the cyst wall; three inches of the adherent portion could not be separated. The appendix was cut from the tumour and ligatured; a plug of solid fæces was squeezed out of it.

My first ovariotomy was performed upon a patient with a very large cyst adherent everywhere, and at the operation the appendix was so firmly adherent that it was cut and the end ligatured. The main cyst contained two gallons of fœtid pus. Subsequent dissection showed that I had to deal with a fused double ovarian cyst.

It is important to recognise this relation of the appendix to ovarian tumours, because if it be cut through or torn, and the accident not recognised, disaster is sure to follow.

Suppuration of ovarian tumours next claims attention. It was formerly believed that this was almost invariably associated with tapping the cyst and accidental admission of air. Although suppuration occasionally followed the tapping in large cysts, it nevertheless occurs independently of such interference. The cases which most attract attention are those in which suppuration occurs in cysts large enough to rise above the pelvic brim. In smaller cysts, low down in the pelvis, especially dermoids, suppuration is of common occurrence.

Suppuration in ovarian cysts is, in most cases, due to communication with neighbouring viscera, such as intestines, rectum, bladder, or vagina.

The result of the suppuration is to set up almost universal adhesions to surrounding structures; in acute cases severe symptoms arise, and unless the pus find an exit, the patient dies. Even when the pus finds an outlet the patient leads a miserable existence, becomes emaciated by the prolonged discharge, and dies worn out by suffering.

In *acute suppuration* of a large ovarian cyst the symptoms are very characteristic. The patient presents the usual signs of an ovarian tumour, but there are pain and tenderness on pressure; the pulse is rapid and feeble, and there are great emaciation and exhaustion. The temperature is at first high, standing at 100° or 102° in the morning, and rising to 103° or 105° in the evening. As the patients become more and more exhausted towards the close of the case the temperature may fall, and has been recorded as low as 95°. This low temperature has been observed in cases where the pus was unusually offensive. In many cases the urine contains albumen. The cyst sometimes contains gas: under such conditions the tumour dulness is replaced by a highly tympanitic note.

Suppurating dermoid cysts of the ovary are by no means infrequent, and, like other forms of ovarian cysts, when inflamed they become firmly adherent to surrounding structures. They may burst into the peritoneum, or through the rectum, bladder, vagina, or even through the abdominal wall, near Poupart's ligament, or at the umbilicus. Records of a large number of cases of pelvic dermoids, which have suppurated and discharged through mucous canals, occur in medical and surgical literature. In some the fistula which forms gives rise to very little

inconvenience, but when the cyst communicates with the bladder it may entail the greatest misery—fragments of bone, teeth, locks of hair, and sloughs become impacted in the urethra, and cystitis, with all its attendant evils, is the almost constant accompaniment. The fragments of tissue retained in the bladder often become covered with phosphatic deposit.

Several instances have been recorded in which a tooth has formed the nucleus of a vesical calculus. The most convincing case of this nature is one recorded by Blackman :—*

A woman thirty-six years of age had been married twelve years, and remained sterile. At the age of twenty-one she suffered from pain, and, for thirteen months, amenorrhœa. At that time she had an escape of air from the bladder. For years she suffered from irritability of the bladder and the escape of urine from the rectum. At the age of twenty-six a phosphatic calculus was extracted, having a tooth for its nucleüs. A year later a similar one was removed. At the age of thirty a third was removed. At thirty-three a fourth was found fixed in an opening just sufficient to admit the tip of the forefinger at the upper and left part of the bladder. After this operation urine ceased to flow from the rectum. A few months later hair, encrusted with phosphates, was passed, and there was reason to suspect another calculus. The history ceases at this point.

Sir Benjamin Brodie has recorded a case in which two ovarian teeth and a fragment of bone formed the nucleus of a vesical calculus.

An extensive study of the clinical reports of cases in which dermoids have suppurated and burst, either through the abdominal wall or into mucous canals, shows that

* *American Journal of Medical Sciences*, January, 1869, p. 49.

the contents of the cysts have, in a few instances, sloughed out, and the sinus closed, but in the majority life has been rendered a burden, death being induced by hectic, the duration of the case varying from a few months to several years. Occasionally the patients lead a tolerably comfortable existence, even in those cases where the cyst communicates with the bladder. Such patients are annoyed with the formation of concretions, which require removal from time to time, but eventually death is induced as a consequence of renal complications.*

A case full of interest, in demonstrating the relation between suppurating ovarian cysts and the intestine, has been recorded by Doran :—†

A woman twenty-six years of age was suddenly seized with rigors and severe abdominal pain, symptoms which led a practitioner to regard the case as one of typhoid fever. Fourteen days afterwards Mr. Manser was consulted, and detected an ovarian tumour, and he came to the conclusion that the high temperature, 100° to 102°, was due to peritonitis complicating ovarian disease. Eventually she came under Dr. Bantock's care, at the Samaritan Hospital. This surgeon removed a suppurating multilocular tumour of the left ovary, containing seven pints of turbid fluid. The tumour was very closely adherent behind to eight or ten inches of the lower part of the ileum. The patient died on the eighth day after the operation.

At the *post mortem* examination ulceration was detected in the ileum, and a perforating circular ulcer, with clean-cut edges, unassociated with Peyer's patches, was

* Herman's paper, "Suppurating Dermoid Cysts of the Pelvis," contains abstracts of many interesting cases. (*Trans. Obstet. Soc., London*, vol. xxvii. p. 254.)

† *Trans. Path. Soc.*, vol. xxx. p. 298.

found. Perforation was commencing in several neighbouring ulcers.

Adhesions, from whatever cause arising, are a source of anxiety to the operator when they are abundant. A few straggling omental adhesions are of no moment, or a few fibrous bands connecting the cyst to the anterior

Fig. 56.—Portion of the Wall of an Ovarian Cyst, with shaggy Adhesions. (After Doran.)

abdominal wall; but when tracts of the small intestine, or colon, are firmly united to the cyst wall by broad fibrous bands, or the tumour is fixed to the pelvic peritoneum by dense adhesions, the task of removing the tumour is very anxious, tedious, and occasionally impossible.

The mode by which adhesions arise is identical with the process by which bands arise in connection with the

intestines. The peritoneum becomes inflamed, and the exudation which accompanies that process—the so-called lymph—organises, and undergoes slow conversion into fibrous tissue. When the parts united by this material remain in apposition during the process of organisation, a sessile adhesion is the result. If, whilst the lymph is recent or only partially organised, movement takes place between the parts, then the uniting material becomes stretched into broad or narrow bands, according to the amount of surface involved. Thus, in some specimens the cyst when removed presents a shaggy appearance (Fig. 56); whilst in rarer cases the organised material will form a spurious capsule over a large portion of the cyst wall. Long adhesions are usually found over the anterior wall and crown of a cyst; sessile adhesions are most frequent on its pelvic aspect.

Old-standing adhesions usually contain blood-vessels, and these, when they spring from intestine or omentum or uterus, are of large size, and bleed freely when detached. So vascular are these adhesions that in some cases in which the pedicle of the tumour has been destroyed by rotation, or dragging, they have served to keep the tumour alive.

Adhesions to the pelvic peritoneum are most dreaded by surgeons, not only because of the difficulty in reaching them, but also on account of their relation to the iliac arteries and veins, the ovarian vessels and ureters at the brim of the pelvis. The iliac vessels have been laid bare in separating adhesions, and lacerated; the inferior vena cava and the ureter have been torn through. In many cases the cyst wall has been found so intimately united to the peritoneum that a portion of it has been left behind.

It used to be the practice to endeavour to determine the existence of adhesions before advising operation, but

it has so frequently happened that when adhesions have been suspected the surgeon has found the cyst free, and when none have been suspected the tumour has been universally adherent, that it is not always easy to determine whether a cyst is fixed in the pelvis by adhesions, impacted, or situated between the folds of the broad ligament.

CHAPTER XIII.

AXIAL ROTATION.

Cysts and solid tumours arising in connection with the ovaries, Fallopian tubes, and uterus occasionally rotate on their axes: a movement which leads to the torsion of those structures which form the pedicle of the tumour, and gives rise to changes of pathological and clinical importance.

Axial rotation has been most carefully studied in ovarian and parovarian cysts. Rokitansky drew attention to its occurrence in 1860; since that date it has been studied by surgeons.

Judging from the many recorded cases, it would seem that twisted pedicles occur in about ten per cent. of the cases of ovarian and parovarian tumours.

Concerning the cause of this rotation we know little. Various explanations have been advanced. It has been attributed to the alternate distension and evacuation of the bladder (Klob); or to the passage of fæces through the rectum (Lawson Tait); to sudden movements, such as a fall, slip, or unusual exertion (Thornton). An important fact to remember is the frequency with which this accident occurs when ovarian cysts complicate pregnancy. In fifty-seven instances of axial rotation recorded by Thornton, fourteen were thus associated: that is, one-fourth of the total number.

When both ovaries are cystic, the risk of twisting is nearly the same as when pregnancy and an ovarian cyst are associated; when both ovaries are cystic and

pregnancy ensues, the risk of axial rotation is more than doubled.

The torsion may occur early in the pregnancy or be delayed till delivery; in many of the cases it happened shortly after delivery or miscarriage.

The occurrence of acute torsion immediately after delivery is doubtless due to the rapid diminution in size of the uterus, and the movement which this organ, as it sinks into the pelvis, imparts to the tumour.

A case of great importance in this relation has been recorded by Edwards:—*

A woman twenty-four years of age had, for at least two years previously, an ovarian tumour on the right side. The tumour did not attract much attention until she became pregnant, in the early part of the year 1860. In October of that year she was delivered of a child which was scarcely full grown, and survived its birth a few days. *Immediately after the birth of the child the tumour shifted over to the middle of the abdomen.*

On August 5th, 1861, this woman was again delivered of a child at the seventh month; it lived a few hours. After the birth of the child the tumour was found in the middle line of the abdomen. Two days later collapse occurred, and the patient died on August 8th.

At the *post mortem* examination the pedicle of the cyst was found twisted one turn and a half; it contained eight pints of blood-stained fluid. The ovary was found on the surface of the cyst; it was therefore of parovarian origin.

Rotation of a cyst in the early stages of pregnancy is probably due to the gradual enlargement of the uterus displacing the tumour upwards, and as the pressure is exerted upon one side of the cyst, it would be in a

* *Lancet*, 1861, vol. ii. p. 336.

favourable position to impart a rotatory motion to a non-adherent cyst. The *amount* of rotation varies greatly: in some cases the cyst has only turned through half a circle, in others as many as twelve complete twists have been counted (Halliday Croom). The direction of the rotation may be from right to left, or *vice versâ*, but cysts exhibit a stronger tendency to rotate towards the middle line rather than from it. Tumours of the right and left side are equally liable to rotate.

The *effect* of torsion on the circulation depends on the tightness of the twist, and this varies with the thickness of the pedicle. The vessels in a long thin pedicle would suffer obstruction quicker than those in a short and thick one. When a pedicle is torsioned the thin-walled veins become compressed, whilst the more resilient arteries continue to convey blood to the cyst. The result is severe venous engorgement, and this leads to extravasation of blood into the cyst wall; in many cases the veins rupture, and hæmorrhage takes place into the cavity of the cyst. The hæmorrhage may be so profuse as to cause profound anæmia, and even death. Sir Spencer Wells* relates a case which occurred at the Hospital for Incurables, Putney. The patient had been found dead by the bedside. On opening the abdomen a large ovarian cyst was found, which contained five pounds of blood-clot: the bleeding was secondary to a twisted pedicle.

This surgeon has briefly recorded a more exceptional case:—

He went once to operate on a lady who had died unexpectedly two hours before his arrival. "The *post mortem* examination showed that death was due to a very large extravasation of blood, first into an ovarian cyst,

* *Ovarian and Uterine Tumours*, p. 64; 1882.

and then, after its bursting, into the abdominal cavity, evidently the consequence of a complete twist of the pedicle by the rotation of a non-adherent cyst."

When the venous circulation is completely arrested in consequence of torsion, the appearance of the cyst is very striking and characteristic. On opening the abdomen during life, instead of the cyst presenting the familiar white glistening appearance, it has a deep dark lustreless hue, which is most intense near its attachment to the pedicle. In milder degrees of torsion the change in colour only affects the base of the tumour. The pedicle on the distal side of the twist presents the same dark hue, but on the uterine side it is, as a rule, of natural tint. The contrast of colour in the two parts of the pedicle is very striking. The walls of the cyst are thick and succulent; the fluid contained in the cavity, or in the loculi if multilocular, may be of a chocolate or of a dark red colour.

When such a cyst is removed from the body and the blood allowed to drain away, or is washed away by a gentle stream of water, the tissues will resume their natural colour. This should be remembered, because some writers have attributed this dark colour to gangrene of the cyst. This is erroneous; gangrene of an ovarian cyst is a rare event, and can only take place when air is admitted from without, as during the operation of tapping, or when intestinal gases gain entrance.

The usual effects of acute torsion of the pedicle are passive congestion, thrombosis, and extravasation of blood into the tissues of the tumour and necrosis.

Necrosis is localised death, in contrast to death of the organism as a whole, or "somatic death."

Moist gangrene is necrosis followed by decomposition and putrefaction of the dead tissues. When soft parts necrose in situations where they are accessible to putrefactive

organisms, such as the exterior of the body, the lungs, or the intestinal tract, decomposition rapidly ensues, especially if the parts contain much blood. In the case of ovarian tumours with twisted pedicles, not in communication with the outer air directly or indirectly, putrefactive organisms can rarely gain access to them to cause decomposition.

It is therefore erroneous to describe as gangrene the changes observed in cysts with torsioned pedicles. This is further illustrated by the circumstance that small ovarian tumours may be completely twisted from their pedicles, and subsequently shrink. Were the changes in the cyst gangrenous in character, general infection of the peritoneum and death would be the inevitable consequences.

A probable case of *gangrene* of an ovarian cyst in association with a twisted pedicle has been put on record by Thornton,* but the accident was complicated by tapping. The facts of the case are briefly these:—A married woman twenty-eight years of age was admitted into the Samaritan Hospital (1875) with an ovarian tumour. She was 4½ months pregnant. On October 19th she was tapped, and ten pints of fluid removed, but some masses of smaller cysts were left behind. Next day she had headache, temperature 100°, and a rapid pulse, and this condition continued for a few days. On October 26th the patient, after turning rather quickly in bed, was seized with extreme abdominal pain; her face became dusky, the pulse was feeble and rapid, and the temperature began to fall. Next morning the patient's condition was much worse, and it was decided to open the abdomen. The tumour was found behind the uterus. It "was mottled black and white, and dull, and coated with lymph in patches, evidently in a partially gangrenous

* *Trans. Path. Soc.*, vol. xxvii. p. 212.

condition"; the pedicle was short, and twisted three and a half times upon itself. The patient died sixteen hours after the operation.

Even in this case the evidence that the cyst was gangrenous is not of the most satisfactory kind.

A perusal of the records of cases described as gangrene indicates that the reporters have regarded the deep livid hue of such cysts as evidence of gangrene, and others have confounded suppurating and gangrenous cysts.

Rotation of an ovarian cyst when it gives rise to such severe changes as have just been considered may be described as *acute torsion*. It frequently happens that during the performance of ovariotomy a thick pedicle is found twisted through half, or even a complete circle, without producing an appreciable effect upon the tumour. In others, torsion takes place so gradually yet so completely that the pedicle is twisted like a rope, and not infrequently the pedicle breaks and the tumour becomes detached from its uterine connections. To this variety the term *slow* or *chronic torsion* may be applied. Its effects are not less interesting than those which follow the acute variety. When rotation occurs slowly the walls of the cyst inflame, and adhesions are established between the cyst and the omentum, or the parietal peritoneum; such adhesions become vascular, and maintain the vitality of the cyst wall after circulation is arrested through the pedicle. Such adhesions prevent atrophy of the cyst, but are probably not sufficient to allow of it continuing to increase in size. Cysts have been observed in all stages of transplantation. The best example which I have had an opportunity of observing of this kind of adhesion was a cyst removed by Greig Smith; it was adherent to the omentum, but a thin frail band of tissue connected the tumour with the right angle of the uterus. The tumour was of the size of a melon and

multilocular; one loculus contained a patch of piliferous skin. The thin frail ligament which indicated the uterine

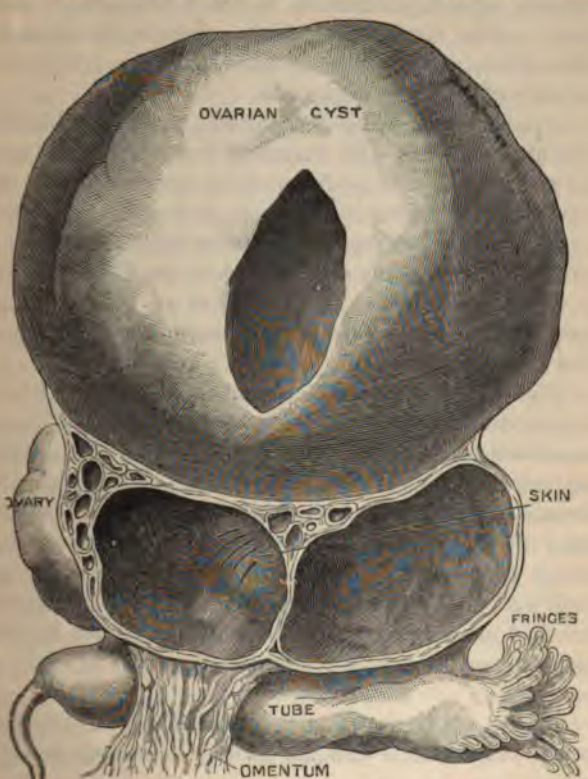

Fig. 57.—Ovarian Cyst which had become detached from its Uterine connections, probably by torsion.

attachment of the tumour was connected with the outer half of the Fallopian tube, which formed a conspicuous object on the cyst wall (Fig. 57).

It is a fact, not without interest, that *acute torsion* is

more frequently seen in tumours of medium size; acute torsion occurs in small cysts, but it is the small tumours, especially dermoids, in which *slow torsion* takes place. The tumours in which complete detachment takes place, accompanied by transplantation, are in the majority of instances dermoids.

Axial rotation, acute and chronic, occurs in all kinds of ovarian tumours. Its frequency in dermoids has been mentioned; twisted pedicles have been reported in multilocular tumours, in sarcomata, and parovarian cysts.

It occurs at all ages. Thornton has observed it as early as the thirteenth, and Bantock at the fifteenth year.

Potter has recorded an example in an old woman of eighty-three years. The rotation in this case did not give rise to trouble.

The frequency with which axial rotation occurs when an ovarian tumour and pregnancy co-exist has been mentioned; it is quite as frequent when ovarian cysts are associated with uterine myomata. Small tumours probably rotate more easily than large ones, but the larger the cyst the more severe are the effects. The greater proportion of detached ovarian tumours are of small size. In nearly all reported cases the completely detached tumours have been oöphoritic; but an unmistakable case of separated *parovarian* cyst is figured on page 109.

It must not be forgotten that twisted pedicles are met with in pedunculated tumours growing in connection with other organs.

The symptoms of acute rotation of an ovarian cyst are often so characteristic as to lead to a correct diagnosis. When a woman complains of sudden and violent pain in the abdomen, accompanied with vomiting, and she is known to have an ovarian tumour, or she presents herself for the first time to the surgeon and these signs are

associated with an abdominal swelling, the physical signs of which are indicative of an ovarian tumour, axial rotation should be suspected. Should the patient possess a gravid uterus as well as an ovarian cyst, it is even more probable that rotation has occurred; or if she have an ovarian tumour and has been recently delivered, this is an additional reason for suspecting that the symptoms arise from a twisted pedicle. The first case which occurred in my own practice was instructive. The patient was a very stout woman, about forty years of age, married, but had never been pregnant. She was suddenly seized whilst getting out of bed with severe pain in the right side, near the last rib. Her medical attendant was summoned, and he detected a tumour—probably a uterine fibroid—blocking up the pelvis. A movable tumour could be felt in the right iliac and lumbar region, manipulation of which caused great pain. The symptoms indicated that the tumour in the right side was probably an ovarian tumour which had rotated; the mass in the pelvis was distinct from the tumour on the right side. The woman was admitted into the Middlesex Hospital, and the symptoms continuing, I opened the abdomen, and found on the right side a multilocular ovarian tumour as large as a cocoa-nut; the pedicle was twisted one turn and a half. The tumour was engorged with blood: during the manipulation necessary to remove the tumour the largest loculus ruptured. The tumour on the left side was a multilocular cyst as large as an orange wedged tightly in the recto-vaginal pouch. The woman made a rapid recovery.

Lawson Tait points out that in some of these cases the abdomen undergoes a very rapid and unusual increase in size a few days before, or coincident with, the access of violent pain.

It is very important to be thoroughly alive to the

possibility of this complication arising in a woman known to have an ovarian tumour, for in very acute rotation the patient's life depends on prompt action. This is admirably illustrated by the case reported by Dr. Wiltshire,* which has since become classical as the first instance in which ovariotomy was performed for acute symptoms caused by axial rotation. The patient was a woman fifty years of age, suffering from a very large ovarian cyst, which had been known to exist for some years. A few days before Dr. Wiltshire saw her she was seized, after some unusual exertion, with acute pain, tenderness, and swelling of the tumour, accompanied by incessant vomiting. The pulse was feeble (105), the extremities cold, and the urine small in amount. Stimulants were freely administered. Next day (May 4th, 1868), after successfully overcoming the prejudices of the practitioner in charge of the case and Dr. Murray, the abdomen was opened by Dr. Wiltshire. The tumour presented the appearance of a strangulated pile. There were no adhesions. When the cyst was punctured a gallon of venous blood flowed through the cannula. The pedicle was tied in the usual way, but on cutting away the tumour the ligature slipped. The pedicle was so rotten that in order to arrest the hæmorrhage it was necessary to transfix "the right half of the body of the uterus," and tie it with a stout silk ligature. The patient made an admirable and uninterrupted recovery.

The case was a typical example of the effects of axial rotation, but the amount of twisting was not noted. "Mr. Spencer Wells suggested the source of the blood was the twisting of the cyst upon its pedicle;" and Dr. Wiltshire writes: "This explanation occurred to me at the time of the operation, for I noticed that the position

* *Trans. Path. Soc.*, vol. xix. p. 295; 1868.

of the tumour was altered after tapping." The case is of great interest, as marking a distinct advance in our method of dealing with this accident.

In many cases axial rotation can be and is correctly diagnosed; often the accident is suspected when in reality it is imitated by other conditions. This is more especially likely to happen when a gravid Fallopian tube ruptures. The two conditions often simulate each other. The differential diagnosis will be considered when dealing with tubal pregnancy.

The importance of recognising the symptoms caused by the rotation of an ovarian tumour, and the difficulty which may beset the interpretation, are well set forth in the following instructive case, described by Lawson Tait:—

He was called (1868) to see in consultation a woman forty-eight years of age with a small strangulated femoral hernia. This was relieved by herniotomy, and the acute symptoms subsided. Two days later the abdomen was tympanitic, temperature 101°, face dusky and anxious. Four days after the operation she died.

At the *post mortem* examination a small ovarian cyst was found lying in the pelvis; it had rotated, and the pedicle had been tightly twisted through four and a half revolutions.

In the slow or chronic variety of axial rotation the symptoms are not so severe as to enable a diagnosis of the condition to be made. Doran is the only writer who has suggested that "dull constant abdominal pains in a patient who keeps in good health and bears a cystic tumour that increases but little or not at all in the course of many months or years is a suspicious symptom."

The *treatment* of a case of ovarian tumour in which twisting of the pedicle is suspected admits of no question: it is immediate ovariotomy; and some of the most brilliant results in abdominal surgery have been

obtained in operations undertaken for this condition. The prognosis is very good, especially when adhesions are absent, or slight and few in number. The pedicle rarely causes trouble, as it is already narrowed by the rotation, and in many cases the vessels have become torsioned.

Literature. — Rokitansky: "Ueber der Strangulation von Ovarial-tumoren durch Achsendrehung," *Zeitsch. der K. K. Gesellschaft der Aerzte in Wien*, 1865; Lawson Tait: *Diseases of the Ovaries*, p. 295, 4th ed., 1883; Doran: *Tumours of the Ovaries*, p. 118; Turner: *Edin. Med. Journal*, 1860–61, vol. vi. p. 698; Thornton: *International Journal of Med. Science*, 1888, p. 357; Barnes, *Diseases of Women*, p. 336, 1873, collected together the chief references up to that date, and adds some interesting cases; *The Transactions of the Obstetrical Society, London*, vol. xxii., 1880, contains a report of an excellent discussion on axial rotation of ovarian tumours; Küstner: *Centralblatt für Gyn.*, 1891.

CHAPTER XIV.

PRESSURE EFFECTS.

THE pressure effects to be studied in connection with ovarian cysts are of two kinds:—The effects upon the cyst itself, and the mischief produced upon adjacent organs.

On examining a thin-walled oöphoritic, or a parovarian cyst, many must have wondered, considering the great tension of the parts, how it continued to grow under such conditions, and with what slight force it could be ruptured. Indeed, so thin are the walls of these cysts in many places that manipulation during their removal often causes them to burst.

Rupture of ovarian cysts is sometimes occasioned by *violence; spontaneous rupture* is a consequence of change in the cyst wall due to gradual thinning, the result of continual pressure; in some cases it is caused by venous congestion, secondary to *rotation* of the *cyst* producing torsion of the pedicle. Before describing the various forms of rupture, some attention must be devoted to what is called *leakage*. An examination of the walls of many oöphoritic cysts reveals the fact that they are not of uniform thickness; in some parts the thinner portions project as rounded prominences. These projecting and thin portions frequently correspond to the so-called secondary cysts; it is these thin cysts which so frequently rupture during the removal of a multilocular tumour; there is good evidence to lead us to believe that in the ordinary course of events such cysts

occasionally burst into the peritoneal cavity, and cause no harm.

Secondary cysts also rupture into the main cavity of the tumour. On examining the interior of a cyst in which this has occurred, the ruptured cyst is represented as a more or less shallow recess in the wall of the main cyst; in course of time it shrinks, and gradually suffers effacement. Soon after rupture the margins of the burst cyst become thick and rounded, and as the cyst wall shrinks the recess resembles very closely the fossa ovalis, and its rounded edge the annulus ovalis, on the wall of the right auricular cavity of the heart. As the edge contracts the recess becomes obliterated, and its position indicated by a thick radiating patch of cicatricial tissue. When small loculi—or secondary cysts, as they are frequently called—are situated near the periphery of a large cyst, they produce absorption as the result of continued pressure, and at last form prominences on its exterior. As a rule, only a few of these projections are present, but occasionally they are so numerous as to give the cyst an embossed appearance. It has already been mentioned that cysts, originally multilocular, may become unilocular in consequence of the septa between the various cysts undergoing atrophy. An intermediate stage of this process is shown in Fig. 58; in this specimen two cysts of equal size have been growing side by side, persistent pressure has led to perforation of the septum; this converts the dividing wall into a diaphragm with a central perforation. As the cyst grows the orifice increases in size, and the septum gradually atrophies, leaving, perhaps, a ridge on the inner wall of the cyst.

The mode by which two cysts fuse together in one ovary illustrates the mode by which cysts originating in opposite ovaries fuse and communicate so as to form one cyst, or "fused double ovarian cysts," as they are

called. Such conditions are, fortunately, not common, for they greatly embarrass the surgeon. The identification of the condition depends on the recognition of two true

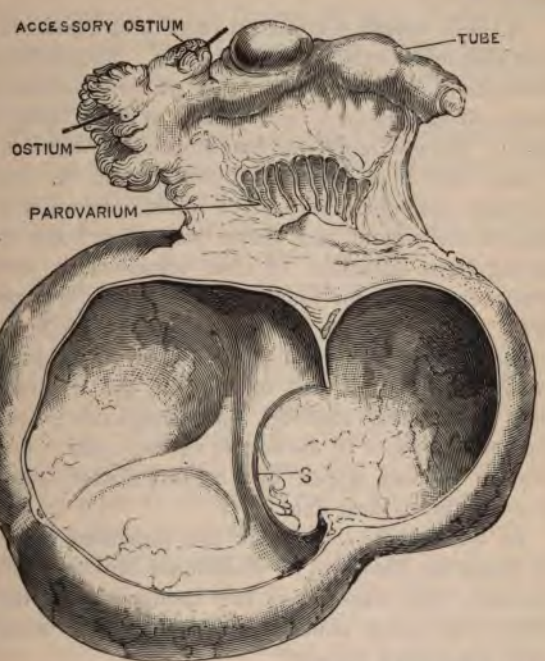

Fig. 58.—Oöphoritic Cyst with a perforated Septum, s, between its two Loculi.

pedicles. One of the pedicles may be mistaken for a dense adhesion.

When the wall of a secondary cyst is very thin, or the parietes of an unilocular cyst become very attenuated; there is reason to believe that transudation takes place into the peritoneal cavity, the fluid being slowly absorbed. This gradual leakage causes no ill effects to the patient,

and the presence of even a large quantity of ovarian fluid is tolerated by the peritoneum. An interesting and striking instance of this has been recorded by W. A. Meredith:—*

A single woman, forty-seven years of age, had suffered from abdominal enlargement ten years. She came unde observation August, 1871. An ovarian tumour was diagnosed and tapped, twenty pints of fluid being withdrawn. The cyst re-filled in four months. "After suffering a smart attack of pain near the seat of the tapping puncture, she noticed one day a sudden alteration in the shape of the tumour, and within twenty-four hours began passing large quantities of clear urine. This state of diuresis persisted for four or five days, at the end of which time all traces of the abdominal swelling had disappeared." This re-filling of the cyst, followed by spontaneous rupture and removal of the extravasated fluid by diuresis, recurred with remarkable regularity three or four times in the course of each year. On one occasion she was tapped by a country doctor, who drew off a "pailful of clear fluid."

In September, 1879, when she presented herself at the Samaritan Hospital, no abdominal tumour could be detected; she returned in two months, and "the abdomen was found uniformly distended by a tense distinctly fluctuating tumour."

This cyst, which had ruptured thirty-four times during a period of nine years, was removed December 4, 1879. The only adhesions present were a few filamentous bands about the site of the tapping puncture. The cyst contained twenty-one pints of fluid. It had one large cavity, with a group of secondary cysts growing on its inner wall; "the remains of the ovary, together with the

* *Trans. Path. Soc.*, vol. xxxi. p. 180.

adherent Fallopian tube, are seen on its outer surface." This is sufficient to show that it was a parovarian cyst. Numerous recesses and cicatrices were detected on the inner wall of the cyst.

It is remarkable that during all the years the patient had this tumour "she was never once incapacitated for a single day for the performance of her ordinary duties as a housemaid."

The history of this extraordinary case illustrates admirably the clinical signs of so-called spontaneous rupture of a large unilocular cyst:—

1. Sudden accession of pain, accompanied by alteration in the shape of the tumour.
2. Subsequent profuse diuresis.
3. Gradual re-accumulation of the fluid in the cyst.

This case demonstrates the rapidity with which large quantities of fluid collect in ovarian and parovarian cysts after rupture. The following account of a large dried ovarian cyst preserved in the museum of the Royal College of Surgeons is also significant in this respect:—

The patient was twenty-seven years old when the disease commenced, after a miscarriage of her first child. Between the year 1757 and August, 1783, when she died, she underwent the operation of tapping eighty times; and in these operations there were altogether removed from her 6,631 pints of fluid, or upwards of thirteen hogsheads. One hundred and eight pints was the largest quantity ever taken away at one time; she was never tapped more than five times in one year, and the largest quantity in a year was four hundred and ninety-five pints. The most fluid collected in the shortest space of time was ninety pints in seven weeks, from July 24th to September 10th, 1780, which is very nearly two pints a day. "On the 10th of August, 1783, the

poor woman died. On the following day, on opening the body, seventy-eight pints of clear fluid were drawn off. Supposing, therefore, all the fluid to have been taken off at the last operation, then in three weeks she had collected seventy-eight pints, which is more than three pints and a half each day—a quantity far exceeding what she had taken." The disease was situated in the left ovarium. The sac is in the collection of John Hunter, Esq.

The history of the case is recorded by Mr. P. M. Martineau, surgeon to the Norfolk and Norwich Hospital, in the *Philosophical Transactions* for 1784, vol. lxxiv. p. 471.

Tombstones have been used to record less remarkable cases. In Bunhill Fields burial-ground, according to T. Safford Lee,* there is an old tomb (1728) with an inscription to the effect that it contains the body of Dame Mary Page; she died in her fifty-sixth year. "In sixty-seven months she was tapped sixty-six times, had taken away 240 gallons of water." Lee writes: "She was a patient of Dr. Mead, who mentions the case." Lawson Tait† mentions a similar epitaph in a churchyard at Romsey, Hampshire, declaring that Mary Dawkins, aged ninety years, had been tapped for dropsy forty-six times. The date on the stone is 1826. Peaslee‡ has collected some extraordinary cases of this kind from American literature.

The rupture of an ovarian cyst is sometimes attended with hæmorrhage, or, what is more probable, the escape of fluid may relieve the tension, and free bleeding takes place into the cavity of the cyst. Rapidly fatal hæmorrhage from rupture of an ovarian cyst is usually associated

* *On Tumours of the Uterus, etc.* (Jacksonian Essay), p. 166; 1847.
† *Edin. Med. Journal*, July, 1889, p. 7.
‡ *Ovarian Tumours*, p. 40.

with axial rotation of the tumour: an accident which has been fully considered. When a multilocular cyst bursts, the fluid which escapes is rarely great, for as it flows through the rent it carries before it a secondary cyst, which quickly plugs the opening.

When the fluid is mucoid or colloid in character, it is not tolerated so easily by the peritoneum, and peritonitis may result. The omentum becomes thickened and dotted with small opaque bodies, and the peritoneum is injected and roughened, sometimes giving rise to a kind of faint crepitus when palpated.

Olshausen* refers to this peculiar crepitation as *colloidknittern*, but says it may be perceived in relation with unruptured cysts.

When cysts containing papillomatous masses, or malignant growth, rupture, portions of the *débris* are scattered far and wide through the peritoneal cavity, and become engrafted on the peritoneum. The effects of this in relation to papillomatous cysts has already been considered in chapter ix.

When describing the distribution of the pelvic peritoneum, mention was made of a case in which a secondary process of this membrane descended towards the perineum, behind the vagina.

Matthews Duncan,† in some interesting *Notes on the Morbid Anatomy of Douglas's Pouch*, refers to the case of a woman, a patient in the Royal Infirmary, Edinburgh, who had a large ovarian cyst, which burst and discharged so copious an amount of very viscid clear jelly as to distend her abdomen extremely; it was too viscid to flow through a trocar. In the latter weeks of the woman's life a rounded firm tumour protruded from the vagina.

* *Krankheiten der Ovarien*, s. 119.

† *St. Bartholomew's Hospital Reports*, vol. xvii. p. 1.

At the *post mortem* examination it was found to be a hernial protrusion of the peritoneum of Douglas's pouch. At the bottom of the fossa was an opening admitting two fingers, which established communication with the hernial sac, descending between the rectum and vagina, and then protruding the latter. The sac was larger than a hen's egg. It was full of very viscid gelatinous ovarian fluid, which adhered to its peritoneal surface.

Rupture of ovarian cysts into hollow viscera.—It has already been shown that ovarian cysts, especially dermoids, are prone to inflame and contract adhesions to the adjacent portions of the alimentary canal, especially the rectum. Such adhesions produce intimate union of the parts, and subsequent osmosis of intestinal gases leads to suppuration of the cyst, the pus finding an escape through the rectum by means of a fistula which forms between it and the cyst.

Communication may take place between the cyst and an adjacent loop of gut in the same method by which adjacent cysts communicate; the continuous pressure that they exert upon each other produces absorption of the tissues forming their walls.

The results of such changes are interesting. The museum of St. Bartholomew's Hospital contains a specimen thus described in the catalogue:—

"Portion of a cyst originating in the left ovary. It communicated with the ileum by a small aperture between four and five inches above the ileo-cæcal valve. Some weeks before death, after the discharge of a large quantity of fluid *per anum*, the abdominal tumour diminished in size, and the dulness to percussion over its region was replaced by tympanitic resonance."

Dr. Murchison* has recorded an instance in which an

* *Diseases of the Liver*, p. 465; 1st ed.

ovarian cyst opened into the rectum, the complication being recognised during life:—The patient was thirty-seven years old; on her admission into Middlesex Hospital the abdomen was found considerably distended by a tumour rising above the pubes, and reaching higher than the umbilicus. The tumour was dull on percussion, and distinctly fluctuated. A few days after admission the patient suffered from diarrhœa, dry tongue, rapid and feeble pulse; there was considerable tenderness over the tumour. Fourteen days later a quantity of pus passed with the motions, and continued to pass for three days. Six days later the tumour could not be felt above the pubes, and she died shortly after. At the *post mortem* examination a collapsed cyst the size of a cocoa-nut replaced the left ovary; it had emptied itself by an opening the size of a fourpenny-piece into the rectum four inches above the anus. There was no ulceration of the mucous membrane of rectum round the opening in the cyst. The sigmoid flexure of the colon and the tip of the vermiform appendix were firmly adherent to the walls of the cyst.

Bright* relates the details of a case which occurred at Guy's Hospital. A young woman, twenty-two years of age, had felt a tumour in the right iliac fossa for about a year. Three months before admission diarrhœa came on, and the tumour diminished. Four months after admission she died. At the *post mortem* examination a cyst about six inches long, and probably ovarian, was found adherent to and communicating with the cæcum.

Rupture from violence.—Beaumont† mentions an example of this. A woman who had laboured under

* *Clin. Memoirs*, p. 104; Syden. Soc.

† Bright's *Clinical Memoirs*, p. 121; Syden. Soc.

ovarian dropsy many years fell from some high steps in brushing the ceiling of a very lofty room, and burst the sac. Two days after the accident she was seen by Mr. Beaumont, who found her without pain, but feeble; her attendant produced three large chamber-pots full of urine which she had passed in twenty-four hours, and which increased quantity continued for four or five days afterwards. She never filled again, but became very thin and emaciated, and died in London two years afterwards.

Barnes* briefly records the case of a woman with an ovarian tumour who was descending in the lift at the old St. Thomas's Hospital. The machinery gave way, and the lift came down with a run. The concussion burst the cyst. Copious diuresis followed. The woman recovered.

Wiltshire† has recorded an instance in which a lady with an ovarian cyst stood up in a hansom cab to speak to the driver through the trap in the roof. The horse fell, and she was thrown forward on the sharp angle of the corner of the door, and burst the cyst. The patient recovered. When an ovarian cyst complicates pregnancy, the cyst, if allowed to remain, not infrequently impedes delivery, and is ruptured.

Ovarian cysts have been accidentally ruptured in a variety of ways: *e.g.* during an *immoderate fit of laughter*, in stooping to *button the boots*, or even during the *manipulation* of the physician. Among other causes may be mentioned *vomiting* and *coughing*, but by far the most frequent cause is a *fall*.

When the tumour is very large, and extends upwards beyond the umbilicus, it leads to displacement and

* *Diseases of Women*, p. 339; 1873.
† *Trans. Clin. Soc., London*, vol. xv. p. 1.

distortion of the abdominal organs, and the diaphragm is pushed upwards, and encroaches upon the cavity of the thorax. When the cyst is very large, the lower ribs may be turned outwards, the intercostal spaces widened, and the lower portions of the lungs become atelectic from pressure. Such conditions seriously impair respiration, and lead to pleural effusion, dyspnœa, and death. Fortunately, at the present day such conditions are rarely witnessed, as the patients, inspired by the great success that now attends abdominal surgery, usually seek relief before the tumours attain such large dimensions.

The tumour may press upon the veins at the brim of the pelvis, and give rise to œdema of the lower limbs, or if the inferior vena cava is pressed upon, fluid will accumulate in the belly.

Occasionally, when the tumours are impacted in the pelvis, they will press upon the rectum, and cause obstruction to the passage of fæces, or press upon the bladder, and give rise to frequent or painful micturition.

By far the most important complications arising from pressure exerted by these tumours are those which occur when one or both ureters are compressed. The renal changes that complicate ovarian tumours form two distinct groups :—

1. Changes due to mechanical interference with the escape of urine—hydronephrosis.
2. Inflammatory changes originating in the bladder.

When the free flow of urine down the ureter is interfered with, in consequence of the compression of this duct by a tumour, the retained fluid causes at first distension of the ureter and the renal pelvis. If the obstruction continue, it will lead to sacculation of the kidney, and finally absorption of the secreting tissue of this organ, which at length becomes converted into a retention cyst—a condition of the kidney conveniently termed

hydronephrosis. There are few facts at our disposal relative to the frequency with which hydronephrotic distension of the kidney complicates ovarian cysts, because the condition when caused by these tumours is, as a rule, unilateral, and unless very large, rarely attracts attention.

Henry Morris, in his well-known admirable monograph on *Surgical Diseases of the Kidney*, points out: "When the dilatation is insufficient to give rise to a tumour, there are generally no symptoms characteristic of hydronephrosis: it is simply a silent complication, or consequence, of some other condition to which, and not to the insidious changes going on in the kidney, the attention of the surgeon or physician is called."

Hydronephrosis, secondary to the pressure of an ovarian cyst on one or both of the ureters, has been several times recorded, in which the dilated kidney was large enough to become conspicuous clinically.

Treves* published an account of a case in which hydronephrosis was produced by the pressure of ovarian cysts.

Each ovary was occupied by a multilocular cyst the size of a hen's egg; the left kidney was hydronephrotic, the right one was healthy. Both ovaries were removed by abdominal section, as well as the affected kidney. The patient's convalescence was retarded by peritonitis, but eventually she recovered.

It is essential in all cases of hydronephrosis, especially when both kidneys are affected, to examine the pelvic organs.

Thornton† has recorded a case in which Sir Spencer Wells opened a hydronephrotic cyst in the loin; subsequently an ovarian cyst was removed, and finally the remaining kidney was incised and drained.

* *Lancet*, Sept. 24th, 1887.

† *Med. Times and Gazette*, 1883, vol. i. p. 624.

There is a form of renal disturbance caused by large ovarian and parovarian cysts to which Sir Spencer Wells has directed attention, and which is obviously the result of the pressure exercised by the tumour. This disturbance is indicated by the voiding of "only a small quantity of highly concentrated urine, depositing mixed urates in abundance." So much importance does this surgeon attach to it that he writes:—"If ovariotomy be performed on a patient in this condition, a serious amount of kidney congestion, with symptoms almost amounting to uræmic fever, is almost certain to follow the operation." He also recommends the employment of lithia in various forms in order to "clear the urine."

Doran is of opinion that clinical evidence makes it appear that the excretion of small quantities of urine loaded with pink urates is entirely due to the pressure of the tumour; and that if the cyst be tapped the urine is at once secreted in greater quantities, and less charged with solid constituents.

I have seen these conditions associated with œdema of the legs, and without the least trace of albumen in the urine, and have regarded it as an indication for urging, rather than deferring, the removal of the tumour.

The precise cause of the diminution in the quantity of urine secreted under such conditions is not very clear.

Beck has shown that "three chief causes are at work, in various degrees, in the production of secondary renal disease:—(1) Increased pressure in the tubules from obstruction to the escape of urine; (2) reflex irritation of the kidney; (3) the presence of septic matter in the pelvis of the kidney."

As a rule, increased backward pressure will produce hydronephrosis, whereas reflex irritation will excite the transient or congestive types of urinary fever. Morris, in

regard to reflex irritation, believes that it alone occasionally excites the inflammatory form of urinary fever: *i.e.* acute or sub-acute interstitial nephritis. It seems, therefore, reasonable to believe that the scanty secretion of urine possessing a high specific gravity in association with ovarian cysts is due to partial obstruction of the ureter, leading to increased pressure in the urinary tubules, accompanied, in some cases, by what we term, for want of more accurate knowledge, reflex irritation of the kidney. It also seems clear that a persistence of such conditions, short of causing complete obstruction, and its necessary consequence, hydronephrosis, will lead to those profound textural alterations in the kidney which may be expressed by the phrase "chronic interstitial nephritis."

We must now consider the more serious condition, when inflammatory changes in the bladder and kidney are associated with the presence of an ovarian cyst.

Cystitis may occur in a patient with an ovarian tumour as a consequence, or independently, of its presence. Under any condition it is a serious complication. It is not the cystitis that the surgeon fears so much as the morbid changes it induces in the kidneys. When fermentation of urine occurs in the bladder, the agents by which this change is induced pass by way of the ureters to the renal pelvis, and the inflammation thus excited extends thence into the substance of the kidneys, giving rise to suppurative nephritis and pyonephrosis, conditions which surgeons too well know always increase the risks of surgical operations of all kinds.

The dangers of such conditions to patients who are submitted to ovariotomy is shown by Doran's statement, "that in thirty-two out of over forty necropsies I have made on the bodies of patients who have died, either after ovariotomy or with large ovarian tumours in the

abdomen, I have found that the kidneys presented very distinct morbid appearances. The clinical evidence was strong that in the majority of these cases the disease was due to the presence of a tumour."

Intestinal obstruction caused by ovarian cysts.—Several cases have been recorded in which intestinal obstruction has been caused by ovarian cysts. This accident may be due to a piece of gut becoming strangulated round the pedicle of a cyst.

Hilton Fagge reported an example of this.* A woman, seventy-four years of age, was admitted into Guy's Hospital in 1863 with symptoms of strangulated hernia, and died six days later. At the *post mortem* examination a piece of ileum was found strangulated by passing round the pedicle of an ovarian cyst.

Mundé† reported, for Dr. Henry, a case in which fatal intestinal obstruction resulted from the ileum being strangulated by the pedicle of an ovarian cyst holding about a pint of fluid. The pedicle was six inches in length, and the obstruction occurred about twelve inches above the ileo-cæcal valve. The patient was forty-five years of age. The symptoms were those of acute intestinal obstruction.

M. Ricard‡ describes a most instructive case where acute symptoms of obstruction came on in a waitress at a restaurant, aged twenty-four. Intense pain in the right side of the abdomen set in when she was at work. She had to go home; furious vomiting occurred, and at the end of the second day it became fæcal. Three days later she was sent to hospital in a state of collapse, with all the symptoms of acute peritonitis. The abdomen was opened, and a dermoid ovarian cyst was found in the

* *Guy's Hospital Reports*, vol. xiv. p. 357.
† *Am. Journal of Obstet.*, vol. xiii. p. 388.
‡ *Gaz. des Hôpitaux*, January 1st, 1891.

right iliac fossa, covered with adherent, inflamed, and distended intestines. These were detached, and then two pedicle-like structures were found. The inner and upper proved to be formed by four inches of small intestine, perfectly empty and intimately adherent to the cyst, whence it had to be carefully dissected. The lower was a true pedicle, twisted, thick, and fleshy. The tumour was removed. On the third day the bowels acted spontaneously. The pain and vomiting ceased immediately after the operation. Recovery was perfect. The close adhesion of the intestine to the cyst was evidently the cause of the obstruction. Before the attack of pain, which seized the patient quite suddenly, she had never been ill, never felt abdominal pain, and never noticed any tumour in the hypogastrium. The menstrual periods had been normal. Notwithstanding these negative symptoms, a small ovarian tumour existed, and caused acute obstruction.

CHAPTER XV.

THE DIAGNOSIS OF OVARIAN TUMOURS.

THE diagnosis of ovarian tumours involves the question of the diagnosis of abdominal swellings in general. Indeed, there is no organ in the belly, except the supra-renal capsule, which has not at some time or other given rise to signs resembling those presented by an ovarian cyst. These facts alone will serve to show that there is no pathognomonic sign indicative of an ovarian tumour. In many cases the methods of physical examination are incompetent to enable us to form a correct opinion of the nature of an abdominal tumour until it has been actually exposed to view; even with the abdomen open doubts and difficulties sometimes arise. The subject will be discussed in this work in the following sections:—

1. Tumours which occupy the pelvis and abdomen.
2. Tumours restricted to the pelvis.
3. Tubal pregnancy.

Method of examination.—When a patient suspected to have an ovarian tumour comes under observation, it is the duty of the surgeon or physician, as the case may be, to inquire into the *history* of the case: information concerning the age, social condition, and menstrual history is often as important in diagnosis as a knowledge of the general physical condition of the patient and the facts she may be able to relate concerning the tumour itself.

In conducting the physical examination of the patient, she should, whenever possible, be undressed, for nothing is so unsatisfactory as exploring an abdomen to ascertain

the existence or nature of a tumour when the parts are encumbered by partially loosened skirts, petticoats, stays, and other garments.

The patient should be placed, when undressed, with her back flat upon a bed or couch, and the legs covered with a sheet or blanket, and the surgeon should be careful that his hands and finger-tips are not cold, as this is most uncomfortable to the patient, and hinders a proper examination.

In a typical case of ovarian tumour the size of the abdomen is increased. With a big cyst the enlargement is general, but localised when the tumour is of moderate dimensions to one or other flank. Local enlargements are always most marked below the level of the umbilicus. The skin of the abdomen sometimes presents a brown discoloration, and the superficial veins may be distended.

On *palpation*, the swelling feels firm and resisting. In cystic tumours its surface is uniform, as a rule, but multilocular cysts may have an irregular surface; this is also true of ovarian adenomata. Manipulation rarely causes pain. In large cysts a wave of fluctuation can easily be produced; in multilocular cysts this sign is restricted to the large cavities. The distinctness with which the wave is perceived depends upon the character of the fluid and the thickness of the abdominal wall.

Percussion furnishes valuable evidence. The crown and sides of the swelling are quite dull, but on approaching the loins the dulness gradually gives way to resonance. If now the patient is turned to one or other side, we shall find that the alteration in position does not affect the percussion note. *Auscultation*, as a rule, gives no information. Gurgling of intestines and, occasionally, the pulsation of the aorta may be perceived, and very rarely a bruit has been detected. In non-ovarian tumours this

method of physical examination often affords valuable information. After examining the abdomen, the surgeon should explore the parts by an *internal examination*. As a rule, this is best made through the vagina, but in young unmarried girls it will sometimes be necessary to make the examination by the rectum. The surgeon can then ascertain the relation of the tumour to the uterus, the condition of this organ, and the state of the rectum. In uncomplicated cases of ovarian tumour the information furnished by a vaginal or rectal examination is negative, but it should always be undertaken, as it is not infrequently of the greatest value in enabling the surgeon to detect complications previously unsuspected.

Lastly, the *urine* should be examined; this, for some curious reason, is strangely neglected by surgeons, yet it often furnishes very significant warning.

The recognition of a large uncomplicated ovarian or parovarian cyst is one of the simplest processes in clinical surgery. The signs may be thus summarised:—A swelling of the abdomen most marked below the umbilicus, associated with absolute dulness to percussion all over the tumour, most marked on its summit, and tailing away to resonance in the flanks; such dulness is not affected by alteration in the position of the patient. If such signs be associated with a uterus of normal size, the presumption that the swelling is an ovarian tumour is more certain than most things in clinical medicine.

The diagnosis of simple cases of ovarian tumour rarely gives rise to difficulty if the surgeon duly weighs the various signs together, and does not place too much reliance on any one of them. Difficulty arises sometimes in distinguishing between ovarian tumours and conditions which simulate them; the greatest care and skill are needed when diagnosis is complicated by secondary changes in the cyst, and by the co-existence of other

tumours, abnormal conditions of the abdominal viscera, ascites, or pregnancy.

Some of the more important conditions which simulate ovarian tumours will now be considered.

Ascites.—Fluid accumulations in the peritoneal cavity are, as a rule, readily distinguished from ovarian cysts, but many instances are known in which ascites has been mistaken for an ovarian cyst, and *vice versâ*.

Under the general term ascites it is usual to include all serous effusions into the peritoneum occurring from obstruction to the portal circulation, renal or cardiac disease. The form of dropsy which gives rise to most difficulty in the physical examination of the abdomen is that which complicates chronic peritonitis, due to tubercle, cancer of the abdominal viscera and peritoneum, and salpingitis. Ascites accompanies certain forms of ovarian tumour.

In well-marked ascites there is rarely any difficulty in diagnosis; the abdomen is uniformly enlarged; when the patient lies on her back the fluid occupies the flanks, and when abundant the sides of the belly form a convex curve from the lower ribs to the crest of each ilium. On percussion, the flanks and lower half of the abdomen are dull, whilst around the umbilicus a clear resonant note is obtained. If the patient be now turned to one or other side, the conditions are reversed; the higher flank becomes resonant and the umbilical region dull. This shifting dulness is the most characteristic sign of ascites. In addition, when the fluid is present in sufficient quantity a percussion wave may be easily produced from side to side.

The condition most likely to be mistaken for ascites is a *large unilocular cyst*. The form of ascites which most simulates an ovarian cyst is a rare variety, termed *encysted dropsy*.

Large passive effusions of fluid in the peritoneal cavity, secondary to hepatic, renal, or cardiac disease, are very rarely a source of difficulty; the history of the case, the general aspect of the patient, and the physical signs connected with the circulation, such as œdema of the limbs, cardiac murmurs, distended superficial veins, and the like, all serve to put us on our guard. It is the acute effusions that complicate malignant conditions of the abdomen which give trouble in diagnosis, and need consideration, for they sometimes deceive and mislead the most experienced men.

In cases of *tubercular peritonitis* the intestines are so matted together and thickened that they may occasionally furnish a dull percussion note in the middle of the abdomen, especially when the omentum forms a broad thick band on the surface of the fluid near the umbilicus, and the intestines are matted together.

Matthews Duncan* writes:—"In several cases an ovarian tumour has been diagnosed, the belly opened, and nothing found but coherent omentum and intestines."

A very rare form of ascites which simulates an ovarian cyst is when the fluid is restricted to the lesser cavity of the peritoneum, due to occlusion of the foramen of Winslow. Lawson Tait records an instance wherein he diagnosed a parovarian cyst in a young girl, and opened the abdomen to remove it, but found "that it was not a cyst of the broad ligament, but *dropsical distension of the lesser bag of the peritoneum*, due to occlusion of the communicating cavity by peritonitis. The inflammation was general, and in spite of drainage she died of the disease in a few days. At the *post mortem* examination it was found that the whole mischief was due to a common

* *Perimetritis and Parametritis*, p. 87.

seamstress's sewing-needle lying in the great omentum, just over the foramen of Winslow." *

The parts which formed the boundaries of the fluid, containing space in this remarkable case are preserved in the museum of the Royal College of Surgeons, London. The catalogue states that "the patient was a lunatic."

A similar form of dropsy of the lesser bag of peritoneum has been found associated with an old hepatic abscess. Some of the cases vaguely described as *encysted dropsy* of the peritoneum were probably *hydatid cysts.*

Ascites due to *secondary cancer* of the peritoneum, malignant tumours of the ovary, and papillomatous (paroöphoritic) cysts, is often associated with grave constitutional disturbance, such as emaciation, general anasarca, sometimes pain and the appearance which is termed cachexia, that usually indicates to the shrewd practitioner the character of the disease.

Many attempts have been made to detect among the *fluids* found in ovarian cysts characters, chemical, microscopic, or spectroscopic, which would serve to distinguish them from passive or inflammatory effusions into the peritoneum. Not only have the attempts failed in this respect, but they have not even succeeded in detecting any signs by which it could be definitely decided that a given sample of fluid indicated malignant disease of the ovary or peritoneum.

In cases where it is impossible to come to a positive diagnosis between the two conditions, and the patient is so greatly distressed by the accumulation that it is necessary to relieve her by removing the fluid or cyst, as the case may be, instead of adopting the unsatisfactory method of puncturing the abdomen with a trocar, I make a small incision in the linea alba capable of admitting an

* *Diseases of the Ovaries*, p. 219; 1883.

index finger. In this way information is obtainable in a manner impossible by other means. If a removable tumour be present, the incision is at once enlarged and the operation completed. Should the fluid be free in the peritoneum, it can be evacuated through the incision quickly and more completely than through a cannula, and without any fear of wounding a piece of bowel that may chance to be floating on the fluid; and if necessary, the cavity may be washed or sponged out.

Ascites is an almost constant accompaniment of *ovarian sarcomata;* it must not, however, be inferred that when ascites co-exists with an ovarian tumour that it necessarily indicates *malignancy*. It is, of course, a very suspicious sign, but many instances have been observed in which such fears have, fortunately, not been realised.

Ovarian sarcomata are accompanied by other signs as well as ascites, which will often lead to a correct diagnosis. For instance, *menstruation* is, as a rule, irregular: in some it is suppressed, in others increased in quantity; it may even be diminished at one period and increased at another. In simple ovarian tumours the menstruation is usually unaffected. *Emaciation* is the rule. *Age* lends no assistance, as malignant ovarian tumours have been reported as early as the eighth year. The *physical signs* of solid ovarian tumours resemble rather those presented by uterine myomata than ovarian cysts; in a fair proportion of cases both ovaries are affected. It should be borne in mind that secondary cancer attacks the ovaries, especially when the primary tumour is in the breast. I have seen well-advanced mammary cancer co-exist with an ovarian cyst. It caused some difficulty in diagnosis, as it gave rise to the suspicion that the abdominal swelling might be ascites, due to secondary deposits in the peritoneum.

The *proportion* of *solid* to *cystic* ovarian tumours is about five of the former to one hundred of the latter.

Phantom tumour.—This very extraordinary condition, sometimes called *spurious pregnancy*—a term which, according to Dr. Robert Barnes, "has been Hellenised by Mason Good into *Pseudocyesis*"—not only simulates pregnancy, but ovarian and other abdominal tumours, and occurs occasionally in men.

The symptoms of phantom tumour are briefly these; a woman will fancy she is pregnant or suffering from a tumour, and states that her abdomen has been gradually increasing in size.

These cases rarely give rise to difficulty. When the abdomen is submitted to physical examination, it will be found everywhere resonant, and loud intestinal gurgling is usually present; by cautiously engaging the patient in conversation during the manipulation, the belly may be pressed quite flat. In such a case the age gives important indications, especially when the woman is long past the climacteric. Again, in younger women, the other signs of pregnancy, such as enlargement of the breasts, morning sickness, increase in the size of the uterus, and amenorrhœa, are wanting.

If after a physical examination the surgeon still feels in doubt, an anæsthetic will decide the question: as the patient becomes unconscious the abdomen diminishes in size until it becomes quite flat; as the patient returns to consciousness the abdominal distension reappears.

Bright has recorded a case of *hysterical distension of the bowels, mistaken for ovarian tumour*, in which an operation was undertaken *to attempt its removal.*

Susannah J——, aged thirty, came under his care in 1824. She had in the middle line of the abdomen, about half way between the umbilicus and the symphysis pubis, an unhealed scar of about three inches in length. The

account the woman gave was that, her abdomen being swollen, a surgeon proposed to her the excision of a tumour which produced this swelling. With two assistants he prepared to perform the operation, and made a free incision into the abdominal cavity, but finding there was no tumour, brought the wound together. This patient remained in the hospital three months, and note was taken of the "occasional puffing-up of the abdomen." The tumour of the abdomen varied a good deal, and was on one or two occasions reported to have subsided entirely.

This woman had, many years before, been under Dr. Marcet's care for a supposed abdominal tumour, who, however, soon discovered its hysteric character: though, certainly, the abdomen bore a very peculiar appearance, strongly resembling an encysted tumour; but there were connected with this supposed tumour so many other ailments, embracing fits of hysterics, epilepsy, paralysis, abdominal and lumbar pains, so varied and so changing, that a little observation was sufficient to convince any experienced person of its real character.*

Lizar's celebrated case (page 200) should be read in conjunction with this.

In reference to Bright's case, T. Safford Lee† states that the patient "gave her account very loosely, and cannot be believed." Lee gives a table of six cases, with the names of the operators, in which the abdomen was opened, but no tumour found.

Phantom tumour occurs more especially in sterile women who have married late in life. It is occasionally met with in women who have borne children, and now and then in young wives. Sometimes it is seen in women who have subjected themselves to illicit intercourse, and fear the results.

* Bright's *Clin. Memoirs*, p. 137; Syd. Soc.

† *Tumours of the Uterus, etc.* (Jacksonian Essay), p. 274; 1847.

Thus, phantom tumours occur under two opposite conditions: the older patients have often a morbid desire for pregnancy, whilst in most of the younger ones there is a dread that they may be in this condition, having run the risk of impregnation.

As to the cause of the singular mimicry no good explanation is forthcoming, and conditions resembling it have been reported in the ass, and are not uncommon in petted bitches.

It is difficult to understand how this condition could be mistaken for an abdominal tumour, yet more than one case has been recorded in which the abdomen was opened to remove the supposed tumour. Most of the cases occurred in the early days of ovariotomy, and now that surgeons are fully aware of the condition, and with the assistance afforded by an anæsthetic, such blunders are not likely to be made.

A patient in middle or advanced life sometimes imagines she has dropsy or a tumour because the abdomen has increased in size; on examination the enlargement will be found to be due to an accumulation of subcutaneous fat and tympanites.

Tumours of the uterus and **pregnancy** not infrequently simulate ovarian tumours. Of all forms of enlarged uterus, *pregnancy* is the one most likely to lead to error, and especially when the patient may have some motive for concealing her true condition. In some instances patients will refuse to believe that they are pregnant until the pains of labour convince them of the fact, and even then they cannot always be convinced. Sir Spencer Wells relates the following case, which occurred at the Samaritan Hospital. The patient was "supposed by an experienced surgeon to be suffering from ovarian tumour, but she denied most positively the possibility of pregnancy; and after a premature labour, probably brought

on by detection of the imposture, accused my assistant, the late Dr. Ritchie, who was hastily called to her, of having brought a child which was not hers, in order to shield me from the charge of having made a mistake."

In cases of unmarried women the greatest caution is necessary before expressing an opinion that the case is one of pregnancy; by a little waiting the case settles itself, and in doubtful conditions nothing is to be gained by giving an opinion straight away, whereas two months is, as a rule, sufficient to lead the patient to thoroughly realise her condition, and she may not, in the circumstances, deem it necessary to trouble the surgeon a second time.

The co-existence of an abdominal swelling, associated in a young healthy woman with fulness of the breasts and amenorrhœa, is a combination of signs always sufficient to put us on our guard, and if on auscultation the fœtal heart sound and the uterine bruit can be heard, or the peculiar rhythmical contraction is perceived when the hand is placed flat upon the pregnant uterus and maintained in that position, the diagnosis is not very doubtful. These, apart from other minor signs which can be taken into consideration, are not likely to mislead a careful practitioner.

To mistake a gravid uterus for an ovarian tumour is an awkward blunder, but it is even more unpleasant to err in the converse direction, and declare a young unmarried woman with an ovarian tumour to be pregnant. Judging from my own observations on the cases sent up as abdominal tumours, which on careful and systematic examination turn out to be unmistakable cases of pregnancy, it is not that the characteristic signs are wanting, but the practitioners who previously examined the patients have failed to appreciate them.

Two rules should be observed in dealing with these

cases of suspected pregnancy—(1) When in doubt, defer expressing an opinion, and see the patient again after a few weeks' interval; (2) *Never pass a sound when there is even a suspicion of pregnancy.*

Gestation in one horn of a *bicornuate* uterus is a condition to bear in mind. Its lateral position may cause it to simulate an ovarian tumour; more frequently it has been mistaken for a uterine myoma. (*See* page 362.)

With ordinary care there is little risk of mistaking a case of normal uterine gestation for an ovarian tumour; but there is an abnormal form of pregnancy occasionally mistaken for ascites or a large ovarian cyst, it is known as **Hydramnios** and is due to an excess of amniotic fluid. The amount of fluid within the sac of the amnion at birth varies in different cases, and although it probably rarely exceeds some six or eight ounces, it may amount to forty ounces without being regarded as pathological.

McClintock* wrote an interesting account of this condition under the title of "dropsy of the ovum," and limits the term to cases in which the quantity of fluid exceeds two quarts. The first case he describes is that of "a lady, aged thirty-three, in her tenth pregnancy, who enjoyed good health up to the beginning of the seventh month of utero-gestation. The abdomen then began to increase in a rapid manner, and in a fortnight attained such proportions as to produce pain and distress. The patient was free from anasarca, the abdomen was immensely swelled, tense, and obscurely fluctuating. She was uneasy in any attitude or position.

"On making an internal examination the membranes were protruding through the os, extremely tense, and no presentation of the fœtus distinguishable. The membranes were torn, 'whereupon a volume of water

* *Diseases of Women*; 1863.

instantly gushed out, and almost at the same time the head of the fœtus. Its birth was retarded as much as possible, but the temporary obstruction caused by the child being removed, the torrent began afresh, filling every available vessel, and deluging the bed and floor within the brief space of a minute or two.'"

McClintock mentions the fact that when it affects a woman with twins, "we usually find that the amnios of one child only is engaged." This he observed in *eleven* twin cases in which the disease was present, and further points out that in thirty-three cases where he particularly noted the facts, five were first labours, eight were second labours, one a twelfth, and the rest intermediate. Subsequent observations indicate that this remarkable condition is most frequently associated with twins; the fœtus is malformed, *hydrocephalus* being the most common abnormality; it comes on usually about the *sixth or seventh month;* its onset may be gradual, but more frequently the fluid rapidly accumulates. Clinically, it presents all the features of a very large *ovarian cyst*, but may be distinguished from it by the existence of the signs of pregnancy, and *ballottement* is particularly distinct.

It is of importance to be aware of this condition, for it has in several instances been overlooked, and the uterus tapped under the supposition that it was an ovarian cyst; abortion follows the tapping, and more than one case has terminated fatally.

Reeves* reported a case in which he opened an abdomen to remove what was supposed to be an ovarian cyst complicating pregnancy, but discovering it to be due to hydramnios, closed the incision. The uterus was then emptied through the vagina, and the patient recovered.

* *Journal of the Brit. Gyn. Soc.*, vol. iii. No. 12, p. 547.

In this case the fœtus was hydrocephalic, and one set of membranes chiefly affected. The patient was twenty-one years of age; it was her second pregnancy, and had advanced to the fifth month.

The following case, reported by Bantock,* is instructive in its bearing on treatment:—

"He saw in consultation a woman thirty-two years of age, the mother of five children. The history given by the patient was that she had been very well until within about a week or two, that she had rapidly increased in that time, and that she had not menstruated for over three months. The abdomen was very much distended, there was free fluctuation over the greater part, and the legs were œdematous. The cervix was somewhat soft and the mammary areolæ enlarged and darkened. The diagnosis was a rapidly growing ovarian tumour, with pregnancy of between three and four months. Arrangements were made as quickly as possible, and he operated on her four days later, assisted by Dr. Dingle. By that time she had still further increased in size, and the œdema had extended to the hypogastrium. On opening the abdomen he at once perceived that the tumour was uterine, and not ovarian, and he concluded that he had to deal with a case of hydramnios. Three courses now presented themselves: viz. whether to close the abdomen and induce premature labour, or to tap the uterus with an aspirator, close the abdomen, and await the issue of events, or to remove the whole organ by supra-vaginal hysterectomy. He chose the last, as offering the best chance of success. In opening the uterus, over thirteen pints of fluid were removed from the amniotic sac, and a fœtus came into view. This was extracted without dividing the cord, and another

* *Journal of the Brit. Gyn. Soc.*, vol. iii. No. 12, p. 489.

was seen, but not removed. The whole organ was now turned out and secured, in his usual way, along with the ovaries by means of a serre nœud. The woman made an excellent recovery." In this case I had an opportunity of examining the parts. The fœtuses were of about the fourth month of gestation, females, and normally formed.

Ovarian cysts sometimes co-exist with pregnancy.—A woman known to have an ovarian tumour subsequently becomes pregnant; such a case may give rise to no difficulty in diagnosis; but when a patient comes under observation with the two conditions co-existing, we have to deal with a combination of circumstances that may mislead the most wary. In many cases the condition of the uterus has not been suspected until the abdomen was opened to remove the ovarian tumour, and even then the enlarged uterus has been mistaken for a cyst, and punctured.

The *diagnosis* of an ovarian cyst complicating pregnancy is based upon the existence of the signs of the tumour plus those of pregnancy. When the tumour is large the abdomen is more widened out laterally than in simple pregnancy, and there is commonly a depression between the rotundity presented by each tumour.

In many instances the tumour is of moderate dimensions, and becomes impacted between the gravid uterus and the pelvis. Such have been mistaken in the early months of gestation for retroverted gravid uteri.

An ovarian tumour may co-exist with tubal pregnancy.—An example of this rare combination occurred in my own practice, and gave rise to rather anomalous symptoms. The following facts may be briefly mentioned :—

The patient was twenty-six years of age, mother of two children, the youngest being six years old. She was

suddenly seized with acute pain in the lower part of the belly. The attack of pain was accompanied by free discharge of blood from the vagina. Menstruation had been quite regular.

On examining the abdomen no swelling could be detected. The left breast was slightly enlarged, and milk could be easily squeezed from it. There was no difficulty with the bladder. On examining the pelvic viscera a rounded, movable, tender swelling could be made out on the left side of the uterus, and a similar but larger swelling on the right side, but this was not tender. The patient was admitted to the hospital next day, and Dr. Boxall kindly saw the case with me. He suspected that it was a retroverted gravid uterus. In order to settle the diagnosis chloroform was administered, and Dr. Boxall pushed the swelling on the left side upwards into the abdomen. It was then found to be distinct from the uterus, which was clearly not gravid. In the afternoon the patient complained of severe aching pain in the back, and had a very thin pulse, and at six o'clock the temperature rose to 103°. I opened the abdomen next day: the peritoneal cavity contained a large quantity of blood, which had escaped from the left Fallopian tube, which was gravid. On the right side there was an ovarian cyst as large as an orange.

Physometra, sometimes termed "emphysema uteri," is a rare condition, in which the uterine cavity is distended with gas, due to the presence of decomposing substances. It might be mistaken for a suppurating ovarian cyst containing gas. I have never seen a case of physometra, and would refer the reader to an exhaustive paper, so far as references are concerned, published by Yarrow.*

* *Am. Journal of Obstet.*, vol. xvi. p. 785.

MORBID CONDITION OF THE UTERUS OTHER THAN PREGNANCY.

Uterine myomata (fibroids) equal, if they do not excel, ascites and pregnancy in simulating ovarian tumours. Many of the largest and heaviest abdominal tumours grow from the uterus.

Not infrequently a myoma grows from the anterior or posterior wall of the uterus, and forms a large pedunculated, smooth, movable tumour, occupying the flank. When such a tumour undergoes mucoid softening and forms a spurious cyst—the so-called *fibro-cyst* of the uterus—the signs of an ovarian cyst are well imitated.

In rare instances a myoma springs from the side of the uterus and pushes its way between the layers of the broad ligament, and then rising in the abdomen, forms a mass which has been known to weigh twenty pounds or more.

Large uterine myomata may co-exist with ovarian cysts; and lastly, an uterus with myomata in its walls may become gravid. The diagnosis is still further complicated by the fact that myomata of large size occasionally arise in the ovaries, and in order to indicate the difficulty which sometimes besets diagnosis, tumours have been removed and the operation completed under the belief that they were ovarian, but subsequent dissection of the parts has shown that the tumours sprang from the uterus.

The *age* of the patient sometimes throws light on the case, as uterine myomata are excessively rare before the twenty-fifth year, uncommon before the thirtieth year, but very frequent after that period of life.

The physical signs of large uterine myomata are in some points identical with those of ovarian tumours. As a rule, uterine tumours occupy the middle of the abdomen, but pedunculated myomata will sometimes lie

in the flanks, like ovarian tumours. To palpation they may be perfectly smooth; frequently they are irregular and tuberose: this is a valuable sign. Uterine, like ovarian, tumours are dull on percussion; the dulness ceases abruptly at the borders of the tumour, and the flanks are resonant in all positions of the patient.

Auscultation is frequently valuable; myomata, especially those which grow rapidly, often yield a loud venous *murmur* when auscultated. This important aid to diagnosis is present in about half the cases. It has been said to occur occasionally in ovarian tumours. I have, as yet, failed to detect it. The murmur is synchronous with the pulse; firm pressure may increase the sound, but sometimes obliterate it. The murmur is usually best heard with an ordinary wooden stethoscope. Often it is as convenient to cover the abdomen with a sheet and apply the ear alone. Frequently the murmur may be heard all over the swelling; occasionally it is limited in its distribution.

A pelvic examination furnishes important information in cases of uterine myoma, for the tumour will be found to have close relations with the uterus. When the examining finger is firmly fixed upon the cervix and the tumour moved by the free hand, the cervix and tumour will move together. Frequently the whole uterus and cervix form a rounded globular mass, occupying nearly the whole available pelvic space, and in the place of an elongated cervix simply a dimple will be found at the top of the vagina, representing the os uteri.

Sometimes the uterine sound will be of assistance. In most cases of myoma the cavity of the uterus is elongated, whilst in ovarian tumour this is rarely the case. Again, the sound may give information of the position of the tumour: whether it grows from the fundus, front or back of the uterus, or involves the whole organ.

The sound is an instrument that requires extreme care, and it should be remembered that a uterus with myomata in its walls sometimes becomes gravid.

Another distinguishing feature of myomata is **menorrhagia**, and this is a very important clinical sign; it is rarely associated with ovarian cysts. Uterine myomata exist without this accompaniment, but when a woman comes under observation with a large abdominal tumour, and complains of menorrhagia recurring at frequent intervals, and presents an anæmic appearance, the tumour in the majority of cases is a uterine myoma.

When free hæmorrhage follows even the gentle use of the sound, it is often an indication that there is a sub-mucous "fibroid" projecting into the uterine cavity.

Ovarian tumours rarely interfere with either the bladder or rectum, yet both conditions occur in uterine tumours. When very large, they compress the parts at the pelvic brim; and when of moderate dimensions they become "locked" in the pelvic cavity and exert pressure on the rectum, and compress the neck of the bladder, leading to retention of urine. Hence pressure symptoms occur most frequently with myomata of moderate dimensions restricted to the pelvis.

When ovarian cysts are associated with a myoma of the uterus, it is extremely difficult to decide whether the second tumour is a pedunculated myoma or an ovarian cyst. Some forms of soft rapidly-growing myomata will yield a false percussion wave, simulating a cyst containing thick tenacious fluid; and a large uterine myoma will still further simulate an ovarian cyst when it has undergone extensive mucoid softening, and forms what is sometimes called a fibro-cystic tumour of the uterus.

In spite of the most careful examination, it is sometimes impossible to decide between an ovarian tumour and

a uterine myoma; under such conditions the surgeon explores the parts through an abdominal incision.

When an ovarian cyst and a myoma of the uterus co-exist, ovariotomy should be performed, and the second ovary, whether diseased or not, should be removed, so as to induce an artificial menopause. Such procedure has been followed by the most satisfactory results, the uterine tumour disappearing. In most cases where ovarian cysts complicate uterine myomata, both ovaries will be found diseased.

The museum of the Middlesex Hospital contains a portion of a very large oöphoritic adenoma, which was associated with a large calcified uterine myoma.

When ovarian cysts co-exist with uterine myomata, especially when both ovaries are cystic, rotation of one of the cysts is very liable to occur.

Fluid distensions of the uterus, such as *hydro- or pyo-metra*, *retained menses*, and the so-called *hydatid pregnancy* are rarely likely to be confounded with ovarian tumours. Retained fluid in one horn of a bicornuate uterus might lead to difficulty, and is a possibility to bear in mind.

CHAPTER XVI.

THE DIFFERENTIAL DIAGNOSIS OF OVARIAN TUMOURS.

Hydatid cysts of the liver, omentum, and broad ligament have often caused difficulty in the differential diagnosis of ovarian cysts.

Hydatid cysts of small size connected with the liver do not give rise to difficulty, but it is when these cysts attain large proportions, displace the viscera, and dip into the pelvis that they simulate ovarian cysts. Hydatid cysts are rarely attended with pain or uneasiness, and it generally happens that attention is first called to them by the patients or their friends noticing the more or less unsymmetrical swelling of the abdomen. These tumours, when they project the surface of the abdomen, appear as rounded, tense, elastic swellings, free from pain or tenderness when uninflamed. They fluctuate distinctly, and a peculiar sign—the *hydatid fremitus*—can sometimes be obtained by placing the palm of the left hand upon the tumour and sharply percussing with the fingers of the right; it is a peculiar tremor or thrill, only felt over a hydatid cyst. The sign is rarely obtained satisfactorily. Hydatid cysts sometimes suppurate, and then all the signs indicative of an abscess are present. Perhaps the best method of obtaining a correct diagnosis is to aspirate the cyst; the character of the fluid quickly settles the question, for it is non-albuminous, clear, probably contains scolices, or hooklets, and chloride of sodium. It

is neutral or slightly alkaline; specific gravity varies from 1,008 to 1,013. Often fragments of the characteristic laminated lining of the cyst will come away. A large hydatid cyst of the liver may co-exist with similar cysts in the omentum, the omental cysts varying in size from a walnut to an orange. Multiple cysts sometimes give rise to the suspicion of malignant disease.

When one or more large hydatid cysts are connected with the omentum, and dip into the pelvis, it is not always easy to form a correct diagnosis, especially when we remember that ovarian cysts of small size may adhere to the omentum, and their uterine or broad ligament attachments become slowly sundered.

Primary hydatid cysts of the ovary are unknown. The museum of St. Bartholomew's Hospital contains a specimen thus described in the catalogue:—

"Part of a large cyst connected with the ovary, and the membranes of some hydatids which it contained. The greater part of the cyst is composed of a tough fibrous tissue, but portions of its walls are as hard as cartilage, and have small plates of bone-like substance in them." In addition, the woman from whom this specimen was taken had hydatid cysts within the ilium, the walls of the bone being expanded so as to form a large cavity, which extended into the sacrum, spinal canal, and acetabulum. The patient was an elderly woman, who died in consequence of the suppuration of some of the cysts. The disease was of long standing.

It is impossible to decide from an examination of the specimen whether this was a hydatid cyst of the ovary or a cyst adherent to the ovary. An extensive search through periodical and special literature, and an examination of the museums of pathology, enable me to state that there is no instance known of a hydatid cyst commencing in the ovary; the few specimens reported

as such originated in the near neighbourhood, and involved the ovary by extension.

Hydatid cysts of the liver occasionally attain such large proportions as to reach and even occupy the pelvis. Bryant* has recorded an instructive example of this. A woman thirty-five years of age was admitted into Guy's Hospital in 1868, under the care of Dr. Oldham, with an abdominal tumour, which had been slowly growing for fourteen years. In 1861 Oldham, under the impression that the cyst was ovarian, tapped it, and drew off seven pints of fluid. The cyst re-filled, and continued to increase in size until her condition rendered it necessary to resort to some effectual mode of treatment. The physical signs presented by the cyst did not quite accord with an ovarian tumour. "On kneading the mass with the hand on either side, a peculiar doughy sensation was felt, unlike what is usually present in ovarian disease, but yet unlike what is usually felt in a hydatid cyst."

When the abdomen was opened and the cyst punctured, it was ascertained to be a hydatid cyst full of vesicles, and Bryant believed that the peculiar physical sign described above "was clearly due to the rolling and pressing together of the immense closely-packed mass of hydatid cysts that the parent tumour contained."

The precise origin of this cyst was never accurately ascertained, as the patient recovered.

Hydatid cysts may grow immediately beneath the pelvic peritoneum, between the layers of the broad ligament, or confined to the subserous tissue of the uterus. In such situations it is impossible to frame precise rules for diagnosis.

Hydatid cysts growing in the subserous tissue of the uterus are very rare. Dr. A. A. Altormyan, of Aleppo,

* *Guy's Hospital Reports*, vol. xiv. p. 235.

North Syria, has described an unusual case. A married woman, thirty-five years of age, came under his care, complaining of a tumour in the abdomen. On examination, a rounded freely movable tumour about the size of the head was found. It did not appear to be connected with the uterus, and was thought to be ovarian; operation was advised. Four months later the patient returned. The tumour was now twice as large as at the first examination; it was painful, and fixed in a more central position. She now consented to its removal.

When the abdomen was opened the tumour was found fixed by a few easily separable adhesions. The trocar drew off some light straw-coloured fluid. The pedicle originated in the substance of the uterus. An elastic ligature was passed around it, and the stump treated by the extra-peritoneal method. The tumour had a thick capsule formed from the fundus of the uterus, just above the attachment of the left Fallopian tube. Within the uterine capsule was found a thick, laminated, homogeneous elastic membrane, displaying a highly peculiar tremulous motion. The cyst contained about a dozen hydatid vesicles and some granular particles. Hooklets and buds from the lining membrane were detected by the microscope. The woman made a good recovery.*

Hydatid cysts grow in the pelvic connective tissue, and attain very large dimensions; they may be associated with hydatid disease of other abdominal viscera or be confined to the pelvis. In most cases such cysts contain echinococcus colonies; occasionally they are sterile, then the true nature of the case is liable to be overlooked.

Hydatid cysts of the pelvis have been carefully studied by Freund,† and his cases are illustrated by some

* *Lancet*, 1891, vol. i. p. 769.

† *Gynäkologische Klinik*, Strassburg, 1885, Bd. 1.

admirable diagrams and drawings. He briefly relates a case which occurred in an unmarried woman, forty-five years of age, who came under his care in a very exhausted and wasted condition. She was suffering from a remittent form of fever, and had for several years complained of

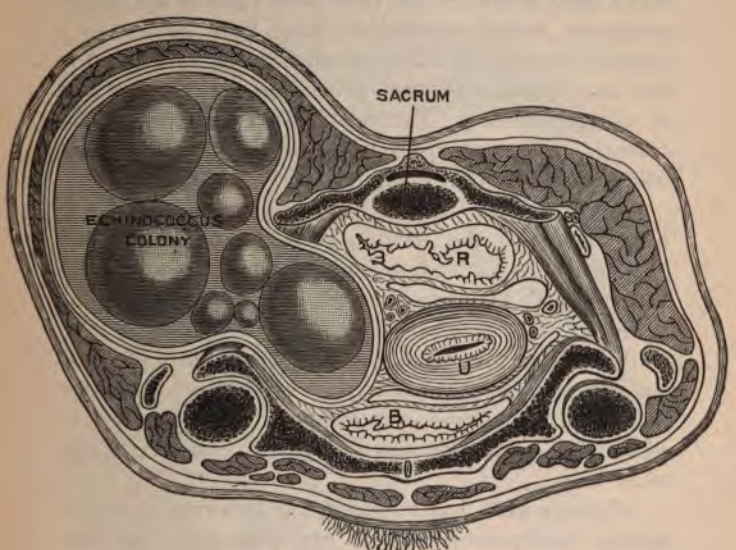

Fig. 59.—Hydatid Cyst in the Pelvis. (After Freund.)
R, Rectum; U, uterus; B, bladder.

increasing difficulty in micturition and defæcation. For some months there had been pain in the pelvis, paralysis, and œdema of the right leg.

A tumour was detected on the right side of the pelvis, displacing the adjacent viscera; fluctuation was also detected over the right sciatic notch. This swelling was punctured with a trocar, and some foul-smelling fluid escaped. Eventually, a section through the pelvis revealed a suppurating echinococcus colony in the

connective tissue of the right side of the pelvis, which had burrowed through the great sciatic notch into the buttock (Fig. 59).

The section represented in the coloured drawing, Plate III., is also from a case by Freund. The patient was a badly-nourished girl, twenty-two years of age, whose subserous tissues seemed to have been subject to a general invasion of these parasites; they were found in the liver, spleen, omentum, pelvic connective tissue, and in the meso-colon. The relation of the echinococcus colonies to the subserous tissue of the broad ligament was admirably shown in sagittal sections of the pelvis.

Hydatid cysts of the pelvis sometimes discharge themselves into the rectum, vagina, or bladder; and Freund details one case in which the vesicles escaped at various times by each of these passages in the same patient.

When the characteristic vesicles, membranes, or hooklets escape either spontaneously or secondary to puncture of a cyst, the diagnosis is simple. The difficulty is in recognising sterile or barren hydatid cysts, especially when large.

Cullingworth* has recorded the following case:—A woman twenty-three years of age came under his care for an abdominal swelling which she had noticed five months previously; she believed herself pregnant. *She had had one child, and menstruation continued through the pregnancy.* Since she noticed the abdomen increasing in size, menstruation had continued regularly, but, remembering her previous experience, she attached no importance to this sign.

The swelling was somewhat globular, and extended from the pubes to a line midway between the umbilicus

* *Trans. Obstet. Soc., London*, vol. xxx. p. 202.

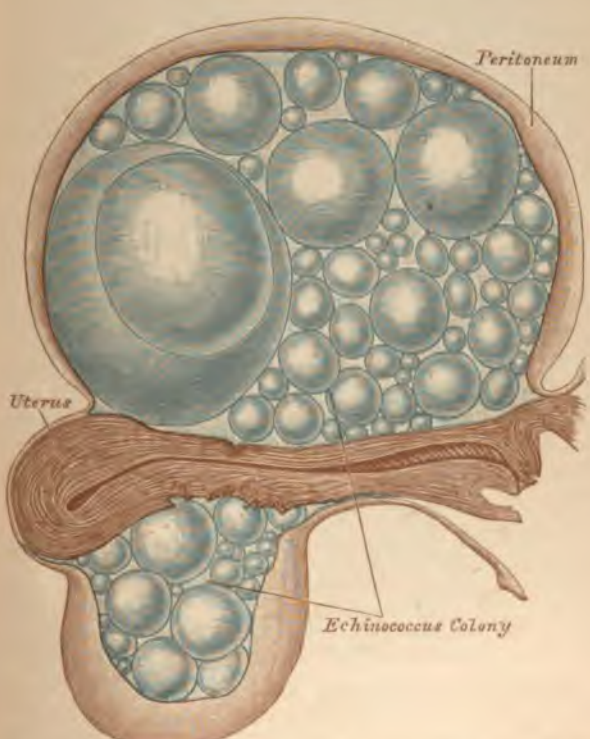

Plate III.—Hydatids burrowing under the Serous Covering of the Uterus. (After Freund.)

and ensiform cartilage; fluctuation could be distinctly felt; there was a bruit, synchronous with the pulse, especially distinct in the left iliac region. One morning, whilst sitting up in bed, she was seized with severe abdominal pain, and the abdomen, which had been very tense, became suddenly soft. A few weeks later the abdomen was again distended, but this time with ascitic fluid. The abdomen was opened, and six pints of ascitic fluid evacuated; the uterus, or what appeared to be the uterus, was enlarged to the size usual at the fifth month of pregnancy. Nothing like a ruptured cyst was discovered, or anything to explain the sudden collapse. She died eleven days after the operation. At the autopsy the uterus was found to be normal in size, and what had appeared to be the uterus was a thick-walled sac, with the uterus embedded in its anterior wall. "On section, a quantity of thick, opalescent, jelly-like fluid escaped, in which were portions of tissue like parchment. No fœtal remains were found. The inner surface of the cyst wall was white and smooth." The specimen was submitted to a committee, which made a long report. The cyst had completely separated the folds of the left, and burrowed into the lower part of the right broad ligament. The cyst wall had an outer fibrous coat, a middle layer of well-developed plain muscle fibres, and an inner coat of connective tissue. The committee expressed no opinion as to the character of this cyst, but the clinical, anatomical, and histological details, though mainly negative, are sufficient to lead me to believe that this was a degenerate or sterile hydatid cyst of the broad ligament.

The occurrence of suppuration in sub-peritoneal pelvic hydatids is due to the fact that such cysts encroach upon mucous canals, such as the rectum, vagina, or intestine, and this allows intestinal gases to invade the cyst, and produce decomposition.

The peculiar and rare variety of echinococcus disease known as multilocular hydatids has not yet been reported in the neighbourhood of the uterus or ovary.

British literature contains very scanty records of pelvic hydatids. Freund's unique experience is attributed to the fact that his observations were made in Silesia—a European region second only to Iceland in the frequency with which hydatids affect the inhabitants. Australian surgeons ought to be able to add to our knowledge of pelvic hydatids in women.

Abnormal conditions of the *kidneys* have frequently been mistaken for ovarian tumours, but since surgical diseases of the kidneys have been more thoroughly investigated, renal tumours are less likely to be confounded by surgeons with those of the ovaries.

The conditions which have been confounded with ovarian tumours are misplaced kidney, single kidney, hydronephrosis, renal tumour, and congenital cystic kidney.

The kidney does not always occupy the hollow of the loin; sometimes it is furnished with a long pedicle, which enables it to freely move about the abdomen; under such conditions it may be mistaken for an ovarian cyst with a long pedicle.

Less frequently, one of the kidneys may lie on the sacro-iliac synchondrosis, or even occupy the hollow of the sacrum. An example of the latter misplacement is represented in Fig. 60. When the kidney occupies abnormal positions of this kind, it always lies behind the peritoneum. It is conceivable that a kidney occupying the hollow of the sacrum or the sacro-iliac synchondrosis might be mistaken for a tumour, if pelvic symptoms should lead to an internal examination.

Hydronephrosis and *pyonephrosis* have been mistaken for ovarian cysts. Such errors are sometimes inevitable, for ovarian cysts with long pedicles sometimes occupy

the loins, and cystic kidneys sometimes extend into the false pelvis. Hydronephrosis sometimes co-exists with, and is caused by ovarian tumours.

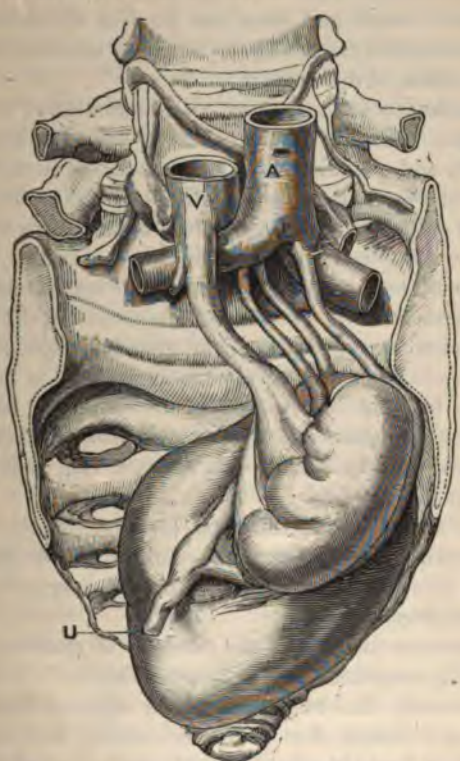

Fig. 60.—Kidney occupying the Hollow of the Sacrum.
A, Artery; V, vein; U, ureter.

The physical signs of renal tumours are very characteristic. There is a swelling in one or both loins, which yields a dull sound on percussion, but as both kidneys have the colon crossing in front of them, an area of

resonance is usually present when they are percussed from the front. It is exceptional for an ovarian cyst to have intestine in front of it, but this may happen when the cyst is small and does not displace the bowel, and when adhesions form between a coil of intestine and the front surface of the tumour.

In addition to these signs, an examination of the urine furnishes valuable evidence, as it may be scanty in amount, and contain blood, pus, mucus, or furnish other evidence of renal disease sufficient to afford the practitioner valuable indications of the nature of the swelling. Another symptom, which is sometimes valuable, is that in cases of hydronephrosis the tumour may intermit, the intermittence being known by diminution in the size of the tumour, accompanied by an abundant flow of urine. This condition is not so valuable as it would at first sight appear, because one variety of ovarian cyst intermits, viz. ovarian hydrocele, *and an intermitting renal cyst is simulated by rupture of an ovarian cyst, followed by diuresis.*

An admirable account of all that relates to the differential diagnosis of renal tumours will be found in Henry Morris's well-known work on the *Surgical Diseases of the Kidney.*

A curious instance of the difficulty of diagnosis is the following, recorded by Mr. Lawson Tait :—*

A patient had been seen by Sir Spencer Wells, who diagnosed fibroid tumour of the uterus; and by a distinguished London physician, who remarked that he did not think there was anything very much the matter. Dr. Milner Moore, of Coventry, was called in, and diagnosed a suppurating ovarian tumour. Mr. Tait saw the patient, in consultation with Dr. Moore, and confirmed his view,

* *Journal of the Brit. Gyn. Soc.*, vol. ii. p. 284.

with the extension that he believed the suppuration was due to strangulation and axial rotation. During the operation the tumour was found to be a suppurating cyst of the left kidney.

Ovarian cyst and hydronephrosis of one or both kidneys may co-exist. In such cases the pressure of the cyst causes distension of the kidney. In such conditions the obvious treatment would be removal of the ovarian tumour.

Spleen.—When of natural size this organ complicates the diagnosis of ovarian tumours only when it is misplaced.

Wilks and Moxon* write:—"We have found a spleen, of twenty-four ounces' weight, entirely dislocated and lying in the pelvis, forming a tumour which might easily have been mistaken for ovarian."

When this organ is very movable it has been termed **wandering spleen.** Rokitansky,† in an interesting, but in England very inaccessible publication, has described some examples of this. In one instance he found a spleen, which had undergone *axial rotation* and strangulation of its vessels, adherent to the entrance of the pelvis.

In some cases of *partial transposition* of viscera the spleen is much displaced. The spleen is very loyal to the stomach, for although the liver occupies the left hypochondrium, the stomach may not be transposed; under such conditions the spleen still retains its relation to the great *cul-de-sac*, and with the stomach is much depressed in the abdomen, sometimes lying in the left iliac region. In such circumstances it may become a clinical puzzle. Whenever the stomach is transposed the spleen accompanies it.

* *Pathological Anatomy*, p. 472; 1875.

† *Zeitschrift der K. K. Gesellschaft der Aerzte, Wien*, 1860, Nr. iii.

An **enlarged spleen** has been mistaken in several instances for an ovarian tumour. When enlarged, the spleen forms a tumour, extending from the left hypochondrium obliquely downwards to the umbilicus, and as far as the pelvis when very large. It gives rise to dulness on percussion, moves up and down with the diaphragm in respiration, lies in front of the colon, and presents a characteristically notched border.

Pancreatic cysts may occasionally attain large proportions, but even when of very large size a cyst of the pancreas is rarely likely to be confounded with an ovarian cyst.

Fatty tumours connected with the omentum or subserous tissue attain an enormous size, and although they ought not to be mistaken for ovarian cysts, are frequently very puzzling.

Sir Spencer Wells* has briefly recorded an attempt he made to remove one, but the patient died. The portion of tumour which he removed weighed twenty pounds. It appeared to have originated in the mesentery.

Mr. Meredith† successfully removed an omental lipoma from a woman sixty-two years of age. It weighed fifteen pounds and a half. The tumour was supposed to be ovarian, and it was with this view that its removal was undertaken.

It seems difficult to believe that the **gall-bladder** could possibly give rise to error in the diagnosis of ovarian cysts. Yet Lawson Tait‡ relates a case in which a woman forty years of age came under his care with an abdominal tumour, which presented the physical signs of a parovarian cyst. He performed abdominal

* *Ovarian and Uterine Tumours;* 1882.

† *Trans. Clin. Soc.*, vol. xx. p. 206. *See also* Homan's *International Journal of Med. Sci.*, April, 1891.

‡ *Edin. Med. Journal*, Oct., 1889, p. 315.

section, making an incision two inches long in the middle line below the umbilicus, and writes:—"On emptying the tumour, I found, to my amazement, that it was a gall-bladder enormously distended." On exploring the cyst, "a gall-stone as large as a filbert-nut impacted in the neck of the gall-bladder was found." Two or three smaller gall-stones were found in the cavity of the cyst. The edges of the opening in the gall-bladder were stitched to the abdominal wound. Bile began to flow from the wound on the morning of the third day after the operation. The patient recovered. The fluid contents from the cyst measured nearly eleven pints, and consisted of clear gluey fluid.

The **liver,** when enlarged, has been found to dip into the pelvis, and cause error in diagnosis; and Mr. Thornton writes that Sir Spencer Wells once explored an abdomen, expecting to find an ovarian cyst, but it was a liver enlarged from cystic disease.

Chylous cyst of the mesentery has been mistaken for an ovarian or parovarian cyst. An interesting instance of this was communicated to the Obstetrical Society, London, by Dr. Adolph Rasch.* The patient was a Jewess, twenty-one years of age. A large roundish elastic swelling occupied mainly the left side of the abdomen. The rounded top of the swelling was about two inches above the horizontal umbilical line. When the abdomen was opened the appearance of the tumour at once struck all present; it was of a pale pink and very glossy, unlike any cyst he had seen before. No adhesions could be felt anywhere. On piercing it with a large trocar, a perfectly milk-like fluid squirted out with great force; little entered the peritoneal cavity. On drawing the walls of the cyst gently out, it became evident that what appeared to be

* *Trans. Obstet. Soc.*, vol. xxxi. p. 311.

a cyst was the two layers of the mesentery separated from each other by the milk-like fluid. The small intestine, of perfectly natural appearance, was connected with the mesentery in the usual way. The hand inside came down to the region of the spine at the usual insertion of the mesentery. The inside of the cyst was intensely congested, looking dark red, and freely oozing. The edges of the cyst were stitched to the skin wound; the patient recovered.

Cysts similar to this have been reported by Bergmann,* Mendès de Leon,† and Fetherston.‡

Dr. Carter§ has published an account of a cyst which formed in the *mesentery*. Before operation it was regarded as an ovarian tumour. It contained sixteen pints of fluid. Judging from the account of the case it seems very probable that it was a sterile hydatid cyst.

Cysts of the great omentum sometimes simulate ovarian cysts. It has already been pointed out that ovarian cysts, especially dermoids, may become detached from their uterine connections, and acquire adhesions to the great omentum, such connections being sufficient in many instances to preserve their vitality. The omentum is a very favourable situation for hydatid cysts. They rarely complicate the diagnosis of ovarian cysts, because, as a rule, *omental hydatids* are multiple, and are much more likely to be confounded with secondary deposits of cancer.

Doran‖ has reported an omental cyst which had been tapped several times by Mr. Goodall-Copestake, under the impression that it was ovarian. Dr. Bantock

* *Arch. für Klin. Chir.* (von Langenbeck), 1887, s. 201.
† *Am. Journal of Obstet.*, vol. xxiv. p. 168.
‡ *Australian Med. Journal*, 1890, p. 475.
§ *British Med. Journal*, 1883, vol. i. p. 7.
‖ *Trans. Obstet. Soc., London*, vol. xxiii. p. 164.

removed it from between the layers of the great omentum below the transverse colon. The cyst, which contained many pints of dark serous fluid, is preserved in the museum of the Royal College of Surgeons. The woman was fifty-eight years of age, and had suffered from the tumour many years. The cyst is a very remarkable one, and, as far as it is safe to hazard an opinion, I think it may have been a sterile hydatid cyst. In the original account of the case a diagram is added to indicate the anatomical relations of the cyst and omentum.

Gooding* has published an account of a similar omental cyst.

Tumours in the hollow of the sacrum, behind the peritoneum.—It has already been pointed out that a normal kidney may be so abnormally placed as to occupy the hollow of the sacrum, lying, of course, behind the pelvic peritoneum; such kidneys, especially when cystic, may be easily mistaken in the course of an examination of the pelvic viscera for a tumour. Such errors have arisen.

There are three morbid conditions connected with this region which may be confounded, unless care is exercised, with ovarian tumours.

Perhaps the most unusual case is that recorded by Emmet.† An unmarried woman, thirty-six years of age, came under his care with a large, soft, fluctuating tumour, situated behind the rectum, and filling up the hollow of the sacrum. The woman, when admitted to the hospital, was supposed to be suffering from an ovarian tumour, but eventually Dr. Emmet became impressed with the idea that it was "a cyst of the right kidney, which had by some means become adherent to the sacrum." Eventually it was aspirated through the rectum, and an ounce

* *Lancet*, Feb. 12th, 1887, p. 311.
† *Am. Journal of Obstet.*, vol. iii. p. 623.

or more of limpid serous fluid withdrawn. The patient died comatose seven days later. At the *post mortem* examination a cyst containing three quarts of fluid was found occupying the pelvis, and extending upwards to the second lumbar vertebra. An examination of the sacrum rendered it possible that the cyst was the sac of a *spina bifida* which communicated with the cavity of the dura mater by a funnel-shaped opening, caused by a deficiency of about half of the three lower bones of the sacrum on the right side. It is much to be regretted that this very unusual case was not dissected with more skill and care.

Mr. Frederick Page* has recorded the facts of a case in which a very large *non-ovarian dermoid* was situated behind the rectum and peritoneum, in the hollow of the sacrum. The patient, a woman forty-seven years of age, was admitted into the Royal Infirmary, Newcastle-on-Tyne, supposed to be suffering from an ovarian tumour. On examining the patient a large swelling could be made out extending as high as the umbilicus. It dipped deeply into the pelvis, and pushed the rectum and vagina forward, at the same time compressing them. In order to ascertain the nature of the swelling an aspirating needle was introduced into it through the rectum; sebaceous material and a hair were withdrawn. This made it evident that the tumour was a dermoid. In consequence of the aspiration inflammatory complications ensued, rendering it desirable to remove the tumour, if possible. The woman was placed in the lithotomy position, and a semilunar incision, six inches long, was made across the perineum, its centre corresponding to a point midway between the anus and the coccyx, and deepened till the cyst was opened, when at once the contents began to

* *Brit. Med. Journal*, Feb. 21st, 1891, p. 406.

exude. Pressure over the abdomen, by squeezing out the thick, putty-like material, mixed with hair, with which it was filled, rapidly reduced the size of the tumour, and it was emptied with a table-spoon. By seizing the margin of the cyst, and passing the hand upwards between it and the tissues, it was readily enucleated and withdrawn. To do this, all the hand and the greater part of the forearm were buried in the wound. Large drainage-tubes were introduced, and the wound was closed with sutures. The patient made an excellent recovery.

The cyst, with its contents, weighed three pounds, and numerous hairs sprang from its inner surface. In the dried condition, stuffed, its circumference in one direction was 29½ inches, in the other 17½ inches. It had no pedicle.

Mr. Page was good enough to let me examine this tumour; it is the largest specimen of post-rectal dermoid that has come under my observation. Dermoids in this situation rarely exceed an orange in size.

Bony tumours and **sarcomata,** springing from the ventral aspect of the sacrum, are not likely to be mistaken for ovarian tumours. I know of no instance in which it has happened.

A **distended bladder** has been mistaken for an abdominal tumour, and even tapped. But it is difficult to understand how such an error arose. The peculiar pyriform outline of the swelling formed by an over-full bladder, sometimes extending as high as the umbilicus, is very characteristic. Extreme distension of the bladder is of frequent occurrence in uterine tumours, especially fibroids, in pelvic tumours, and in retroversion of the gravid uterus. Under the last-mentioned condition the bladder has been reported to have held nine pints of urine.

Fæcal accumulations, or, as they are sometimes called, **fæcal tumours,** occur most frequently in the

colon and sigmoid flexure; as these parts have frequently a long meso-colon, the transverse colon, when U-shaped, may touch the pubes; fæcal tumours may occupy any part of the abdomen. As a rule, they are easily recognised, as they are dull on percussion, doughy to the feel, and readily receive the imprint of the finger-tip. Repeated copious enemata quickly settle the nature of the tumour. The belly has been opened for the removal of such a mass under the belief that it was an ovarian tumour.

Obesity.—It would seem unnecessary to mention that undue fatness could be mistaken for an ovarian tumour, but it is a fact that such errors in diagnosis have been committed, apart from Lizar's* celebrated case, in which, after opening a woman's belly to remove a supposed ovarian tumour, he writes:—"I now proceeded to examine the state of the tumour, when, to my astonishment, I could find none." In continuing the description of the case, he explains:—"The reason why all of us were deceived in this woman's case was the great obesity and distended fulness of the intestines, together with some protrusion pubic of the spine at the lumbar vertebræ."

Abnormal conditions of the *stomach* rarely complicate the diagnosis of ovarian disease, directly or indirectly. Such cases, however, are not unknown.

Dr. Galabin† has recorded an experience illustrating this. "A patient had been sent into Guy's Hospital, under one of his surgical colleagues, with a history that she had been tapped for ovarian tumour, and the fluid had re-collected. On examination, there was evidently a large space containing fluid and gas, and giving a succussion splash. Dr. Galabin was not disposed to think that

* *Ed. Med. and Surg. Journal*, vol. xxii. p. 253; 1824.
† *Trans. Obstet. Soc., London*, vol. xxix. p. 150.

the fluid was contained in a cyst. At an exploratory operation, however, it was thought that there was an irremovable ovarian cyst, and the supposed cyst wall was stitched to the abdominal wound. Not long after, food began to escape through the wound soon after it was taken. The patient died, and at the autopsy it was found that a pseudo-cyst had been formed by peritoneal adhesions, and that there was a fistulous opening into it from the stomach."

Serous perimetritis, described by Dr. John Williams,* is probably a variety of hydroperitoneum, secondary to tubal disease. Serous perimetritis consists of a collection of inflammatory exudation in the recto-vaginal pouch, covered in by adherent intestines, which thus gives rise to the signs of a cyst behind the uterus.

The following abstract of a case recorded by Dr. John Williams will serve as a type:—A widow, thirty years of age, was admitted into University College Hospital with the following history: A month previously she had a rigor, accompanied with great pain. Two days later menstruation set in, accompanied by more than usual pain. From that time she suffered from constipation and painful defæcation. Two days before coming to hospital she felt a sudden pain in the abdomen, became giddy, and fainted. On admission into the hospital, examination caused so much pain that she was eventually examined under chloroform. A swelling was detected behind the uterus; it was a smooth resisting mass of great size, which might have been a tumour, or an enlarged retroverted uterus, or a hæmatocele. The swelling caused protrusion of the posterior wall of the vagina.

An aspirating needle was inserted into the vaginal

* *Trans. Obstet. Soc., London*, vol. xxvii. p. 169.

protrusion, and three ounces of straw-coloured fluid were withdrawn. The needle was inserted into the retro-uterine swelling, and a small quantity of similar fluid was obtained.

Diarrhœa set in a few days later, accompanied by abdominal distension, tenderness, thirst, and rigors. Death occurred sixteen days after admission.

At the *post mortem* examination a collection of coagulated peritoneal fluid was found behind the uterus, and this fluid was closed in above by omentum and small intestines, which were adherent to each other and the fundus of the uterus. The peritoneum lining the cavity was at its thinnest part at least an eighth of an inch in thickness. Unfortunately, there is no mention of the condition of the Fallopian tubes.

With our present knowledge of serous perimetritis it seems that irritant material causes pelvic peritonitis: the irritant matter is probably conveyed to the peritoneum by the tubes in most instances; the inflammation causes the uterus, tubes, and intestines to adhere, and thus isolate the recto-vaginal pouch of the peritoneum from the general peritoneal cavity. The inflammation being of mild type, serum is effused, but the admission of intestinal gases or air will lead to suppuration.

Doran* has recorded the details of a case of anterior *serous perimetritis* simulating ovarian sarcoma: the simulation was so strong that the supposed tumour was explored by abdominal section. No satisfactory conclusion was arrived at during the operation. In the course of convalescence the swelling almost disappeared, and Doran came to the conclusion that it was a case of serous perimetritis. Three years after the operation the girl died of tubercular peritonitis.

* *Trans. Obstet. Soc., London*, vol. xxxi. p. 217; vol. xxxiii. p. 185

CHAPTER XVII.

THE DIFFERENTIAL DIAGNOSIS OF OVARIAN TUMOURS (*concluded*).

MORBID CONDITIONS OF THE BROAD LIGAMENT.

MANY morbid conditions of the *broad ligament* simulate ovarian tumours, and in some the simulation is so complete that accurate diagnosis is impossible. The following conditions will be discussed in this chapter:—

Myomata of the *broad ligament* and *round ligament* of the uterus. Tumours of the *ovarian ligament*. *Allantoic cysts*. *Pelvic cellulitis* and its varieties.

Hydatid cysts of this region were discussed in the preceding chapter, and *broad ligament pregnancy* is so important that it will be dealt with separately.

Myomatous tumours may arise in the broad ligament, and cause great difficulty in diagnosis. Unstriped muscle tissue, apart from the uterus, exists in three situations between the layers of the broad ligament:—1. In the round ligament of the uterus; 2. In the ovarian ligament; 3. In the connective tissue between the folds of the ligament.

Tumours of the round ligament may spring from it in two situations—(1) Within the pelvis, between the uterus and internal abdominal ring; (2) In the inguinal canal.

Sänger* has recorded an example of the first variety in a paper entitled *Weitere Beiträge zur Lehre von den primären desmoiden Geschwülsten der Gebärmutterbänder*

* *Arch. für Gynäkologie*, Bd. xxi. p. 279; 1883.

besonders der ligamenta rotunda, and has collected a fair number of cases. The specimen which formed the basis of his paper occurred in a woman twenty-two years of age. She had had three children. The tumour had been noticed many years. It began as a swelling the size of a dove's egg in the right inguinal canal. When she came under observation the tumour was of large size, occupying the right side of the pelvis, and extending upwards towards the umbilicus. It was removed, but the patient died twenty-four hours after the operation.

It presented microscopical characters of a fibro-myo-sarcoma of the right round ligament.

Matthews Duncan* has recorded a case of tumour of the round ligament. It was about the size and shape of a hen's egg. It lay quite free in front of the right broad ligament. The right round ligament could be traced to its surface, where it ended in a capsule. Its pedicle was small and thick, about a quarter of an inch broad. The structure of the tumour was that of a dense fibroid, with numerous cretaceous points near its centre, and having a fibrous capsule from the round ligament. Dr. Duncan thought that such a tumour was interesting, as it might be mistaken for an ovary if felt during life.

Tumours of the round ligament lodged in the inguinal canal have been recorded by Sir Spencer Wells.† He removed two, both from the right side, in women aged forty and fifty years respectively. One was the size and shape of a cocoa-nut, and the other was as large as an orange. In each case the tumour occupied the inguinal canal, and was removed without difficulty.

"Histologically, the growth in each case was simply an excess of the fibrous tissue of the round ligament of the uterus."

* *Trans. Obstet. Soc., Edin.*, 1876, vol. iv. p. 195.
† *Trans. Path. Soc.*, vol. xvii. p. 188.

Tumours absolutely unconnected with the ovary, ovarian ligament, uterus, or round ligament, occasionally arise from the muscle tissue and connective tissue which lie between the folds of the broad ligament. Such tumours have been little studied.

My first experience of this variety of myoma was a specimen which Dr. Bantock removed by abdominal section from a married woman thirty-nine years of age. She was the mother of four children. The operation was one of great difficulty. The tumour dipped between the layers of the broad ligament, and the reflection of the peritoneum from the tumour to the parietes was above the level of the crest of the ilium. The woman made a satisfactory recovery. The specimen was exhibited at the British Gynæcological Society, November, 1887, and subsequently placed in my hands for examination. I made the subjoined report:—*

"The specimen consists of a uterus and its appendages, associated with two large tumours. When first removed, the parts weighed 11½ lbs.

"On reference to the drawing which accompanies the report, it will be seen that the uterus is of normal size and shape; the Fallopian tubes, ovaries, and round ligaments are spread out and stretched by the tumours. These parts are normal, except that near the fimbriated end of the right tube there were a few small cysts.

"Lying between the folds of the right broad ligament we find an oval-shaped tumour, measuring nine inches in its long, and five inches in its short, axis. At one spot this tumour approached, and was attached to, the right side of the fundus uteri. A portion of this was broken off with the ovary when it came into my possession.

"The left broad ligament is occupied by a similar but

* *Journ. Brit. Gyn. Soc.*, vol. iii. p. 493.

much larger tumour, measuring eight inches across the cut surface and thirteen inches in length. A nodule, projecting from the tumour, has forced its way between the layers of the mesosalpinx, and separated the ovary from the Fallopian tube. A large tuberous portion was adherent to the lower part of the main mass. Externally the tumours were covered by a dense fibrous capsule. On dividing the larger tumour, its centre was found to be occupied by an area of softening, and was as succulent as an orange. The limits of this degenerate portion were sharply indicated by a wall of calcified tissue, in some places a quarter of an inch in thickness. Smaller tracts of softening dotted the surface of the section. The periphery of the tumour was firm, and in some places as resistant as a uterine myoma. The tumour in the right ligament presented a few tough nodules. Under the microscope, sections from the periphery of the tumour exhibited the familiar arrangement of dense fibroid tissue, and in some places a whorled disposition of the fibres was obvious. The softer parts of the mass were made up of spindle-cells, whilst the succulent parts were in a condition of myxomatous degeneration. The tumours must be regarded as spindle-cell sarcomata" (Fig. 61).

At the time of examining this specimen the only tumour known to me with which to compare it was that which Virchow called *fibroma molluscum*, an example of which has been described by Sir Spencer Wells.*

One specimen removed by this distinguished surgeon weighed 68 lbs.

Myomata of the broad ligament, when large, carry the anterior layer of the ligament upwards as they rise out of the pelvis into the belly; thus, in some cases the tumour may extend upwards to the umbilicus external to the peritoneum.

* *Ovarian and Uterine Tumours*, p. 500; 1882.

Fig. 61.—Myoma of the Broad Ligaments. (*Brit. Gyn. Soc.*)
f, Fallopian tubes; *o*. ovaries; *u*, uterus; *c*, cysts.

A specimen illustrating this was exhibited by Dr. Aveling to the Gynæcological Society, London.* The tumour was ten inches long, seven in width, and weighed nearly 5 lbs. It had a thick fibrous capsule, and on section resembled a sponge; the loculi were filled with gelatinous tissue. Lodged in the substance of the tumour were several rounded hard nodules as large as

Fig. 62.—Broad Ligament Myoma. (*Brit. Gyn. Soc.*)
N, Nodule.

walnuts, resembling small uterine myomata on section, and exhibiting the same whorled disposition of fibres, and agreeing with them histologically (Fig. 62).

In my report of this specimen I identified this tumour with the *fibroma molluscum* of Virchow, and believed it arose in the urachus; but since that date I have had many opportunities of more carefully investigating such tumours, and now believe that it, like the large specimen removed by Bantock, was a myoma of the broad ligament,

* *Journal of the Brit. Gyn. Soc.*, vol. ii. p. 187.

which had extended upwards in the subserous tissue, between the peritoneum and the anterior abdominal wall.

Broad ligament myomata do not always attain such large proportions. Specimens have come under my notice which in shape and size resembled cocoa-nuts.

Doran* has described a large myoma of this variety weighing 16 lbs., which he successfully removed; he believed that it took origin from the ligament of the ovary.

It is necessary to distinguish between a myoma of the broad ligament and a myoma growing from the side of the uterus and separating the layers of the broad ligament.

Myomata of the *ovarian ligament* are very exceptional, and rarely exceed a hen's egg in size.

Allantoic or **urachus cysts** occasionally give rise to difficulty in diagnosis. The urachus is the normally impervious cord passing from the bladder to the umbilicus; like the bladder, it represents a persistent portion of the allantois. The urachus is liable to several interesting abnormalities. Instead of dwindling to an impervious cord, it may dilate and form a cyst as large as the bladder. Sometimes the cyst communicates with the bladder, the epithelium of the two cavities being directly continuous.

Lawson Tait† has recorded cases of allantoic cysts of large size. Of course such cysts, like over-distended bladders, are situated between the peritoneum and the anterior abdominal wall.

Rows of small cysts are sometimes seen in the urachus whilst the tissues are being divided in abdominal

* *British Med. Journal*, 1889, vol. i. p. 1287.

† *Journal of the Brit. Gyn. Soc.*, vol. ii. p. 328: "On Twelve Cases of Extra-Peritoneal Cysts."

incisions, but as they are rarely larger than ripe currants, they scarcely call for comment.

Pelvic cellulitis, or inflammation of the connective tissue of the broad ligament, cannot be discussed in a work of this character, except so far as it is concerned in the differential diagnosis of pelvic swellings.

A few years ago it was customary to apply the term pelvic cellulitis to any hard irregular mass which could be detected on one or both sides of the uterus. With our present knowledge it is clear that many conditions were formerly erroneously included under this term, and the attempt to divide pelvic cellulitis into two varieties—such as *parametritis* when the inflammation is confined to the connective tissue, and *perimetritis* when it affects the pelvic peritoneum—was a sound step in the direction of discriminating between the various kinds of pelvic inflammation.

Pelvic cellulitis signifies inflammation of the connective tissue enclosed between the folds of the broad ligament; pathologically it does not differ from septic inflammation of cellular tissue in more superficial regions of the body. It is usually associated with septic changes originating in the cervix and body of the uterus, associated with abortion, delivery at term—especially instrumental delivery—and operations upon the uterus.

The changes consist in the infiltration of the connective tissue of the broad ligament with inflammatory products, which, like such products in general, may undergo resolution, or suppurate and give rise to a pelvic abscess.

To recognise clinically pelvic cellulitis it is necessary to remember that in nearly all cases there is a history of abortion, delivery, or operative interference with the uterus.

On physical examination in the early stage the

infiltration will be found to surround the neck of the uterus like a ring, and then extend indefinitely into each broad ligament. The mobility of the uterus is impaired, and it seems as if this organ were embedded in some firm material. Should the inflammation continue, the infiltration will extend backwards and surround the rectum; anteriorly it will pass forwards under the anterior fold of the broad ligament, and creep up the anterior abdominal wall, even as high as the umbilicus.

Occasionally it infiltrates the connective tissue in the cave of Retzius, and forms sometimes a rounded swelling immediately above the pubes; in a small proportion of cases the exudation extends into the tissue between the cervix uteri and bladder, raises up the peritoneum, and obliterates the utero-vesical pouch. Such exudations sometimes give rise to considerable hypogastric swellings, and cause extreme irritability of the bladder.

In a very large proportion of cases of pelvic cellulitis the swelling subsides, and the patient recovers; the remainder suppurate, the pus escaping by fistulous tracks through the rectum, vagina, bladder, or through the anterior abdominal walls immediately above Poupart's ligament, or near the umbilicus.

The common forms of pelvic cellulitis are rarely mistaken for other conditions, and should there be any doubt, a little patience will, in most cases, enable a correct diagnosis to be made, for rest will promote absorption of the exudation. In cases where suppuration ensues, the clinical signs incidental to that process will declare the presence of pus, and indicate the line of treatment.

The unusual variety which affects mainly the connective tissue between the uterus and bladder may give rise to difficulty. An instructive specimen illustrating this has been described by Dr. Griffith.* The parts

* *Trans. Obstet. Soc., London*, vol. xxix. p. 149.

which are represented in Fig. 63 show a large cavity, which contained pus between the uterus and bladder,

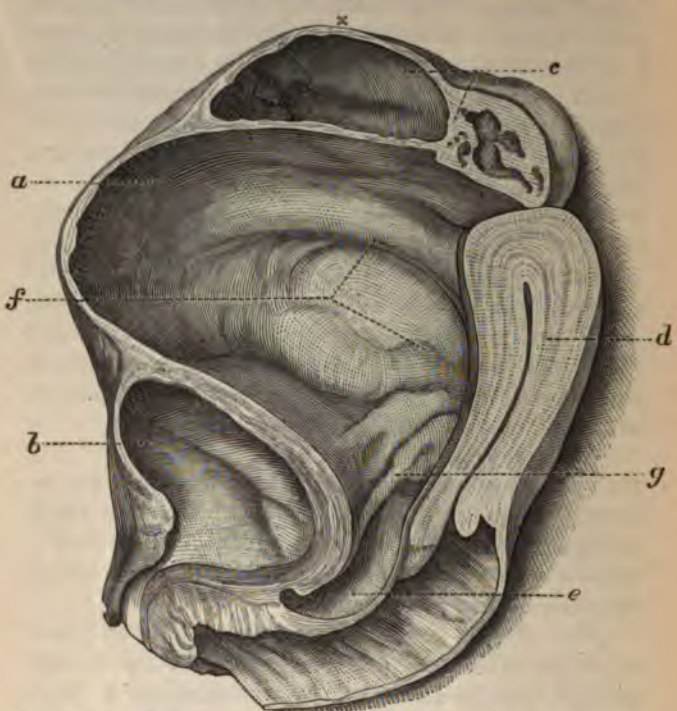

Fig. 63.—Sagittal Section of the parts involved in the so-called Anterior Perimetritis. (After Griffith.)

a, *f*, Abscess cavity; *b*, bladder; *d*, uterus; *c*, ovary; *g*, ureter; *e*, extension of abscess between vagina and bladder; *x*, fimbriated end of right tube.

and was roofed by that portion of the peritoneum which lines the utero-vesical pouch.

The chief physical signs of this condition are hypogastric tumour, which can also be felt through the anterior vaginal wall, and vesical irritability. The tumour

simulates a distended bladder, and may be mistaken for an inflamed and suppurating ovarian cyst.

In the drawing a point of some interest is omitted. An examination of the parts preserved in the museum of the Royal College of Surgeons shows that the *obliterated hypogastric arteries* and the *urachus* traverse the anterior part of the cavity; this is sufficient to prove that the cavity is extra-peritoneal, and that the term anterior para-metritis would be more appropriate. Whether it be termed peri- or para-metritis it would have perplexed a surgeon had the abdomen been opened for its relief.

Pericæcal abscess. — Inflammatory affections about the cæcum are occasionally confounded with suppurating ovarian cysts and pelvic abscesses. It is generally believed that inflammation of the vermiform appendix is rare in females. The truth is that appendicitis occurs in women but is usually regarded as pelvic cellulitis. It should be remembered that the pus in a retro-peritoneal abscess, secondary to appendicitis, readily finds its way between the layers of the right broad ligament, the disposition of the peritoneum favouring the burrowing of pus in this direction.

CHAPTER XVIII.

TREATMENT OF OVARIAN TUMOURS.

THE treatment of an ovarian tumour, including in this general term tumours of the oöphoron, paroöphoron and parovarium, is *early removal*. It has been shown by an overwhelming amount of evidence that the earlier these tumours are removed—that is, before they have acquired complicated adhesions to important organs, or produced any dangerous pressure effects upon the kidneys—the more likely is the operation to be followed by success. Recent writers on ovarian disease have insisted upon the fact that the pernicious practice of tapping, formerly so much advocated, but now, fortunately, almost banished, renders subsequent operations for the removal of the cyst much more difficult, and therefore more dangerous to life.

Paracentesis, or tapping, is now but rarely resorted to for ovarian cysts. Ovariotomy is such a successful operation that it involves little risk and is *curative*, whilst tapping is *palliative*, and often harmful.

Tapping is attended with several risks. If air be admitted into the cyst during the procedure, or the instrument be septic from want of care and cleanliness on the part of the operator, *inflammation* and *suppuration* of the cyst result, with all the attendant dangers.

The fluid may, in spite of care and caution, leak into the peritoneal cavity, and should it possess irritating qualities, fatal *peritonitis* will be the consequence.

Should the cyst contain *papillomata*, as is so frequently the case with paroöphoritic cysts, epithelial elements may be disseminated broadcast over the peritoneum. Should

these possess malignant characters, the significance of the accident is very obvious.

Should there be an error of diagnosis, and a large uterine myoma be stabbed with the trocar, the patient will be placed in great danger from *hæmorrhage*.

In some varieties of cysts the fluid will not run through the cannula, and in multilocular cysts it would be impossible to empty all the loculi.

Very exceptionally it may be requisite to tap an ovarian cyst where a patient is not in a condition to bear ovariotomy. A few writers recommend it when a patient is suffering from some intercurrent trouble, such as bronchitis, or where the pressure of the tumour causes anasarca of the lower limbs.

Under the latter condition it would seem more in accordance with general surgical principles to at once perform ovariotomy, especially when there is no reason to fear malignancy. I have performed ovariotomy under such conditions with the happiest results.

When it is judged really necessary to tap, instead of performing ovariotomy, the safest instrument to use is the aspirator.

Some of the records of cases in which patients have been tapped read almost like fables. Any surgeon contemplating the treatment of an ovarian or parovarian cyst by this method would do well to read the brief details of the case furnished on page 151 of this book.

There are very few contra-indications to ovariotomy; this operation is now performed under what would have formerly been regarded as prohibitive conditions. Some of these we will consider.

Inflamed and suppurating cysts.—The treatment of a *suppurating ovarian cyst* depends upon its situation. In acute suppuration of large cysts immediate removal of the tumour is the proper practice, and

this was forced upon the profession by Dr. Keith.* Writing in 1875, he expresses himself thus:—

"Ten years ago, when cases of ovariotomy were few, and there was little to guide one in unusual circumstances, a young woman in the last stage of ovarian disease came to me a long journey from the north. The fatigue of travelling was too much for the strength that was left, and she arrived completely worn out. It did not seem possible that in such a condition life could be prolonged many days, for the pulse was almost imperceptible: there were vomiting and diarrhœa, œdematous limbs, and albuminous urine, whilst a profuse fœtid discharge was going on from an opening near the umbilicus. The intensity of this putridity was such that one became aware of it before entering the house, and the antiseptics of those days were powerless to arrest it. Day after day I went, expecting and hoping to find her dead; yet, though shrivelled up like a mummy, with an aspect scarcely human, respiration went on for nearly a month, the brain retaining its clearness, acutely alive to what was going on. To remove a putrid cyst in such a condition of feebleness did not occur to me."

In December, 1864, a patient with a large tumour came under his care. She had been jolted for some hours in a coach, and in the hope of relieving the pain thus set up, tapping was performed. The pain was not relieved; flatulent abdominal distension became excessive, and typhoid symptoms set in. Ovariotomy was performed during the semi-delirium of septic fever. The peritoneum was acutely inflamed and intensely livid. Recent lymph was everywhere present, and the cyst putrid. The operation lasted two hours. When the patient was placed in the bed she was cold, vomiting, and nearly pulseless. She regained heat rapidly, the

* *Edinburgh Med. and Surg. Journal*, 1875, p. 673.

delirium disappeared; there were warm perspiration, much sleep, and recovery without a drawback.

This was in 1864. Writing in 1875, Keith was able to give details of ten cases in which he had operated upon suppurating cysts, with only one death. His boldness and enterprise were soon imitated by other surgeons, and the practice became established that suppurating ovarian cysts should be immediately removed.

The treatment of *ovarian dermoids*, when they have suppurated and opened into mucous canals, is not always so precise. In the majority of cases an attempt should be made to extirpate the tumour, and this method has been successful in a large number of instances, and the operation is not always difficult. In many cases the tumour is so bound down that its removal is impracticable. When such cysts have opened into the bladder or vagina, their contents may sometimes be successfully evacuated through the fistulous opening after dilatation of the vagina or urethra, as the case requires.

Pregnancy is no bar to ovariotomy; indeed, experience teaches that when an ovarian tumour complicates pregnancy the tumour should be removed, because the patient runs a great risk of *axial rotation* of the tumour, not only during pregnancy, but especially at the time of delivery, or in the event of miscarriage. Other serious risks are *rupture* of the *cyst*, and even *rupture* of the *uterus*.

Dr. Ogier Ward* recorded a case in which a cyst of the right ovary, as large as a cocoa-nut, so impeded labour, by preventing the head of the fœtus entering the true pelvis, that the uterus ruptured and the patient died.

Rupture of the vagina has been reported during labour, and the ovarian cyst has protruded through the rent.†

* *Trans. Path. Soc.*, vol. v. p. 219.

† Kersmill, *Brit. Med. Journal*, 1880, vol. ii. p. 16. *See also* Barnes, *Diseases of Women*, p. 346.

It is undeniable that in some instances women with an ovarian tumour have been known to pass through several pregnancies without mishap. Nevertheless, the danger to life under such conditions is far greater than the risks of ovariotomy.

A large number of instances of successful ovariotomy during pregnancy has been recorded, from which it may be safely concluded that the operation should be undertaken, if possible, before the fourth month of gestation, in order to avoid abortion.

In several instances double ovariotomy has been performed successfully during pregnancy. A few recorded cases are given in the accompanying table :—

Double Ovariotomy during Pregnancy.

Operator.	Stage of Pregnancy.	Nature of Tumours.	Result.	Place of Record.
Thornton...	Fourth month.	Dermoids ...	Recovered : pregnancy went to 8th month.	*Trans. Obstet. Society, London*, vol. xxviii. p. 41.
Mundé ...	Fifth month.	Dermoids ...	Miscarried 72 hours after operation : recovered.	*Am. Journal of Obstet.*, vol. xx. p. 730.
Potter ...	About fourth month.	Not stated...	Recovered : delivered of a child 5 months after operation.	*Am. Journal of Obstet.*, vol. xxi. p. 1028.
Montgomery.	Third month	Removed both ovaries.	Recovered : pregnancy went to term.	*Am. Journal of Obstet.*, vol. xxi. p. 1084.
Bantock ...	Third month	Dermoids ...	Recovered : pregnancy went to 8 months.	*Journal of the Gyn. Soc. of Gt. Brit.*, vol. vi. p. 4.
Meredith ...	Third month	Papillomatous cysts.	Recovered : went to term.	*Trans. Obstet. Society, London*, vol. xxxii. p. 374.
Meredith ...	Third month	Dermoid and a multilocular cyst.	Recovered : went to term.	Unpublished.

Bateman* has recorded a case in which Sir Spencer Wells successfully operated during the fourth month of pregnancy for an ovarian cyst which had ruptured.

The admirable results which follow even double ovariotomy during pregnancy form a striking contrast to

* *Lancet*, 1869, vol. ii. p. 400.

the risks such patients run when it becomes necessary to perform the operation during the puerperal period.

These are shown in an instructive manner by the following case reported by Sippel:—

A woman with an ovarian tumour became pregnant; at the seventh month she was attacked with severe pain in the abdomen, accompanied with distension and high temperature (101·5°). The tenderness, at first confined to the region of the tumour, became general. This fact, and the sudden accession of pain and fever, suggested torsion of the pedicle, and an operation was advised. She was admitted into the hospital for that purpose, but the same night she was delivered of a living child. It was decided to postpone operative interference, so as to allow involution of the uterus. The symptoms continued so urgent that, in order to avoid a fatal issue, the abdomen was opened: the incision extended above the umbilicus, on account of the size of the tumour. The pedicle was found twisted once on its axis, and the circulation arrested. The patient made a good recovery.

The appended table contains references to a few similar cases:—

Ovariotomy soon after Delivery at Term.

Operator.	Date after Delivery.	Reason for Interference.	Result.	Place of Record.
Gooding ...	5 weeks after	Suppurating cyst.	Death after 39 days	*Lancet*, 1873, vol ii. p. 493.
Veit ...	4 days ...	Torsion ...	Death in 12 hours	*Zeitschrift für Geburtsh. und Gynäk.*, *Bd.* ix. s. 229, 1883.
* John Williams.	During labour.		Recovery ...	*Trans. Obstet. Society, London*, vol. xxvi. p. 203.
John Williams.	31 days after abortion at the fifth month.	Suppuration of cyst, after tapping.	Recovery ...	*Brit. Med. Journal*, vol. ii. p. 973, 1880.
Sippel ...	Second week	Torsion ...	Recovery ...	*Centralblatt für Gyn.*, Ap. 7, 1888.

* Dr. Williams had removed the left ovary for cystic disease in 1879.

These facts show that neither pregnancy nor recent delivery offers serious impediment to the performance of ovariotomy.

The accompanying table shows that even in very advanced life the operation has been performed with a very encouraging measure of success.

OVARIOTOMY PERFORMED ON PATIENTS OVER SEVENTY YEARS OF AGE.

OPERATOR.	AGE OF PATIENT.	RESULT.	PLACE OF RECORD.
Janvrin	77 ...	Success	*Am. Journal of Obstet.*, xvii., 1884, p. 171.
Bennett of Connecticut	75 ...	Success	*Brit. Med. Journal*, 1861, vol. ii. p. 532.
Schrœder	79 ...	Success ...	Olshausen, *Krankheiten der Ovarien*, s. 394.
Schrœder	80 ...	Success ...	Ditto.
Wilcke of Halle ...	77 ...	Success	*Provincial Med. Journal* 1888.
Fancourt Barnes	70 ...	Success	*Medico-Chir. Trans.*, vol. lx. pp. 224 and 227.
Sir Spencer Wells	70 ...	Success	*Medico-Chir. Trans.*, vol. lxx. pp. 57, 64, and 75.
Sir Spencer Wells	77 ...	Death	
Thornton	70 ...	Success	
Thornton	71 ...	Success.	
Thornton	70 ...	Incomplete operation; death in 48 hours ...	
Bantock	71 ...	Success	*Medico-Chir. Trans.*, vol. lxiv. p. 128.
Meredith ...	70 ...	Success	*Med.-Chir. Trans.*, vol. lxxii. p. 50.
Halliday Croom...	70 ...	Recovery	*Obstet. Trans., Edin.*, vol. xiv. p. 94.
Lawson Tait ...	70 ...	Recovery	*Brit. Med. Journal*, 1886, vol. i. p. 923.
Skene Keith ...	70 ...	Recovery	*Brit. Med. Journal*, 1887 vol. i. p. 271.
Skene Keith ...	75 ...	Incision: drainage; recovery	Ditto.
Homans	82 ...	Recovery	*Brit. Med. & Surg. Journa* , May 3, 1888.
Owens of Brisbane	80 ...	Recovery	*Journal Brit. Gyn. Society* vol. iv. p. 88.
Keith (Thomas)...	73 ...	Recovery	*Brit. Med. Jour.*, 1878 vol. ii. p. 592.
Davis	75 ...	Recovery	*Journ. Brit. Gyn. Society*, vol. iii. p. 413.
Holland	76 ...	Recovery	*Journ. Brit. Gyn. Soc.*, part xxvi. p. 179.

The case, mentioned in a few works, in which Dr

Miner is stated to have operated successfully at 82, turns out to be a misprint for 32!* W. L. Atlee's case, so frequently stated to be 78, should be 68.

Ovariotomy in young children is very successful. Of the sixty cases collected in the tables, thirty-five non-sarcomatous ovarian tumours were submitted to ovariotomy, thirty-one recovered and four died, a mortality of only 11·4 per cent.

The nature of the tumour influences materially the result. A glance at such meagre records as we possess of the history of women who have had ovariotomy performed for ovarian sarcoma indicates that the subject is one demanding close study. Thornton† has published records of ten cases submitted to operation. Of these, three died from the effects of the operation. Of the seven which recovered, one remained in good health and had a child two years later, one died a few months after the operation from recurrence in the pelvis, another came under observation with recurrence eighteen months later; the remaining four all died within a year of the operation from dissemination of the growth.

The risks of ovariotomy for *sarcomata* are very great. An analysis of the sixty cases tabulated on page 87 shows that out of forty-six ovariotomies the results were :—

Dermoids ...	24	Deaths ..	3	Mortality	12·5 per cent.
Sarcomata ...	11	,, ...	8	,,	72·7 ,,
Cysts	11	,, ...	1	,,	9·0 ,,

Jessop's case is included among the sarcomata.

It is also well established that convalescence is very tardy after ovariotomy for sarcoma.

It is impossible to state with anything like precision

* *See* Doran and Billings, *Bost. Med. and Surg. Journal*, 1888, p. 638.

† *Med. Times and Gazette*, April, 1883.

the mortality of an operation like ovariotomy. It has been shown over and over again that when the operation is undertaken by surgeons who have devoted attention to this class of surgery the risk is very small; indeed, ovariotomy generally may be described as the safest of the major operations of surgery. In skilful hands an uncomplicated ovariotomy is not attended with more risks than amputation of a mamma without removal of the axillary glands.

The forms of ovarian tumour which give the surgeon most anxiety are those with firm *pelvic adhesions; paroöphoritic cysts*, with papillary contents which burrow deeply between the layers of the broad ligament; and lastly, *ovarian sarcomata*. The size of the tumour rarely influences the result. Sir Spencer Wells, Keith, and others, have removed tumours successfully when weighing 70, 80, and 100 lbs.

Goodell has recorded a successful case in which the tumour weighed 112 lbs.; Cullingworth* removed one—probably the largest on record—which weighed 150 lbs., but the patient died.

It would be interesting to be able to state definitely the risks of operation in each class of tumour; this will be impossible until surgeons feel disposed to accept some definite method of classification, and arrange their cases accordingly. Speaking generally, it may be said that, in experienced hands, the mortality varies from 5 to 10 per cent. Here and there a few operators have published long runs of cases without a death. This is very encouraging; but when large series of cases are collected, the average mortality I have stated will be maintained. With less experienced operators the mortality after ovariotomy will vary from 15 to 20 per cent.

* *Lancet*, 1891, vol. i. p. 999.

Part XI.

DISEASES OF THE FALLOPIAN TUBES.

CHAPTER XIX.

THE FALLOPIAN TUBES.

The Fallopian tubes are continuous with the superior angles of the uterus, posterior to the points of attachment of the round ligaments. When the tubes are straightened, each presents a wide outer end, then gradually narrows to its point of connection with the uterus; the expanded outer end is the *infundibulum*. The average length of each tube is 10 cm.; not infrequently one tube is longer than its fellow: the difference in length sometimes amounts to 1 cm. The inner or uterine third of the tube is narrower than the outer two-thirds, and is sometimes tortuous, and varies in thickness from 2 to 4 mm. The outer segment, or ampulla, near the ostium, varies from 7 to 10 mm. The thickness of the walls of the tube varies inversely with the size of its lumen.

Each tube occupies the free border of the broad ligament; the isthmus is directed outwards and slightly upwards, but the ampulla descends, passes behind and external to the ovary, then turns its ostium upwards, so that the fimbriæ are in immediate contact with this gland.

The tube is mainly composed of unstriped muscle fibre, continuous with that of the uterus, and arranged in an outer longitudinal and an inner circular layer. Loose connective tissue intervenes between the muscular layer and the peritoneum, which invests it on two-thirds of its

circumference. The lumen of the tube is lined with mucous membrane, covered with columnar ciliated epithelium. On slitting open the tube, the mucous membrane will be found disposed in longitudinal folds, or plicæ; when traced outwards, they will be found to increase in thickness on approaching the end of the tube, and at the ostium they will be found to dichotomise and become continuous with the fimbriæ which constitute so conspicuous a feature of this end of the tube.

The abdominal ostium.—No part of the Fallopian tube is so variable in form as this. Morphologically, it represents the anterior end of Müller's duct. According to our present knowledge, the duct is at first closed anteriorly, but at an early date it undergoes cleavage to form the ostium, and thus to communicate with the peritoneal cavity (cœlom). Running from the ovarian border of the ostium to the ovary, and occupying the intervening free border of the mesosalpinx, there is a structure known as the *tubo-ovarian ligament* traversed by a longitudinal furrow, which causes it to resemble a long narrow leaf. This represents that portion of Müller's duct opened out along the line of cleavage. Frequently it is fringed laterally with small fimbriæ, sometimes continuous with, but frequently distinct from, the plicæ in the tube. The fimbriæ around the ostium have been carefully investigated by Richard.* He demonstrated them to be continuous with the folds of mucous membrane within the tube.

Doran† has studied them, and points out that "careful examination of the grooves between the plicæ will enable the observer to trace the particular intra-tubal plica to which each fimbria belongs. There is another order, so

* *Thèse Anatomie des Trompes de l'Uterus chez la Femme*, 1851.

† *Trans. Obstet. Soc., London*, vol. xxxi. p. 344; 1889.

to speak, of secondary plicæ which spring from the sides of the primary plicæ forming the fimbriæ. They give rise to the arborescent appearance seen in microscopic sections of the tube at the ostium. On the other hand, the two divisions of a primary fimbria may join again, as is often seen, above the ostium, within the canal."

As the fimbriæ represent luxuriant folds of mucous membrane projecting beyond the tube, we must study the boundary line, where they bulge beyond the serous membrane. When the peritoneum is traced along the tube to the ostium it will be found to suddenly terminate and form a sharp line. Occasionally, however, the peritoneum extends for a variable distance on the fimbriæ. The sudden termination of the peritoneum on the tube occasionally produces a circular constriction, and indicates the spot where the circular fibres of the tube terminate. The fringed portion of the tube beyond is the *infundibulum*.

The ostium varies much in shape and size, as well as in the number and degree of development of the fimbriæ not only around it, but along the tubo-ovarian ligament. Even accessory ostia and tufts of fimbriæ are occasionally present.

The first systematic description of *accessory ostia* to the Fallopian tubes we owe to Richard.* He found five examples in thirty females. Two of the cases had two accessory ostia in one tube; one of these specimens was a fœtus at term. The figure illustrating this specimen is reproduced by Farre in his classical article, **Uterus**, in Todd's *Cyclopædia*. Since Richard drew attention to the malformation, several observers have recorded cases.

* "Pavillons Multiples Rencontrés sur des Trompes Utérines;" *Gaz. Méd. de Paris*, 1851.

The best account is furnished by Doran,* who, in the course of an examination of 1,000 uterine appendages between 1878 and 1886, met with only five examples of

Fig. 64.—Fallopian Tube, with an Accessory Ostium.

malformed tubes. Five out of six of the cases were removed in the course of operations performed at the Samaritan Hospital, London. One specimen was obtained from a malformed fœtus.

In the specimens examined by Richard the accessory

* "Malformations of the Fallopian Tube;" *Trans. of the Obstetrical Society, London*, vol. xxviii. p. 171.

ostia communicated with the interior of the tube, but Doran has shown that accessory fimbriæ may be present unassociated with an abnormal orifice in the tube; further, an accessory ostium surrounded by fimbriæ, and a pedunculated tuft of fimbriæ unconnected with an accessory opening, may occur on the same tube.

Accessory ostia with fringes and *pedunculated accessory fimbriæ*, without a supernumerary ostium, are by no means rare. Figs. 64 and 65 are from specimens which came under my notice. The example sketched in Fig. 65, B, possessed two abnormal openings.

Pedunculated tufts of fimbriæ are probably derived from Kobelt's tubes. When describing the parovarium attention was drawn to the small pedunculated cysts so frequently found at its anterior end, and known as Kobelt's tubes. Some of these small cysts rupture, and instead of a stalked cyst we find a pedunculated tuft of fimbriæ. The cysts sometimes appear as if growing from the wall of the tube, and I have little doubt that the stalked tufts of accessory fimbriæ originate in similarly displaced Kobelt's tubes. A specimen which supports this view is sketched in Fig. 65, C. A small cyst, furnished with a small tuft of fimbriæ, lies on the tube in such a manner that it seems to grow from the tube, but the pedicle could be easily under the peritoneum until it was lost in the parovarium.

The hydatid, or cyst of Morgagni.—This term is applied to small stalked cysts, attached to the fimbriæ, and in some instances to the tube itself. It is rarely larger than a pea. Sometimes it is represented by a tuft of fimbriæ supported on a long pedicle. Occasionally the pedicle of the cyst is furnished with a small tuft of fimbriæ. The true hydatid must not be confounded with stalked cysts so frequently found associated with

Fig. 65.—A, Pedunculated Accessory Fimbriæ. B, Two Accessory Ostia on one Fallopian Tube. C, Pedunculated Cyst from the Parovarium, lying athwart the Tube; it possesses a tiny tuft of fimbriæ.

P.F., Pedunculated tuft of fimbriæ; O, normal ostium; O' O', accessory ostia.

the parovarium. Ballantyne* and Williams have carefully investigated the frequency with which the true hydatid is present. They found stalked cysts present in 57 per cent. of specimens examined. The true Morgagnian cyst was present in 8 per cent. in adults, and in 27 per cent. of fœtuses and infants. The total number of tubes examined was ninety-four pairs from adults, eleven pairs from fœtuses, and five pairs from children. The structural differences between the two forms are important. According to Ballantyne and Williams, the true Morgagnian cyst "is lined by a mucosa with simple folds, covered by a single layer of ciliated columnar epithelial cells; its wall is always composed of muscular fibres, arranged circularly and longitudinally; its outer membrane is the peritoneum; its stalk is always muscular, and its contents consist of clear limpid fluid;" whereas the small pedunculated cysts of the parovarium have fibrous stalks and walls; the interior of such cysts is lined by cubical epithelium.

The mucous membrane of the Fallopian tube.—The tubal mucous membrane is thrown into longitudinal folds, or plicæ, which are most numerous in the wide portions of the tubes. In the isthmus they are small in size and few in number, and at the uterine orifice the mucous membrane is continuous with that lining the uterus. The epithelium is columnar in shape, and furnished with delicate cilia. It is usually stated that the tube is devoid of glands, but how far this statement represents the actual state of affairs is well open to question. The structure of the mucous membrane of this tube has been so carefully and systematically examined by competent experts that the mere facts are beyond dispute, but they will admit of a different interpretation to that usually

* *Brit. Med. Journal*, Jan. 24th, 1891.

placed upon them, and arguments and facts will now be advanced in order to show that the folds in the tubal mucous membrane are glands.

A gland in its simplest form is a sac or tube derived from the invagination of epithelium. Larger and more complicated glands may be derived from this as the result of secondary outgrowths from the primary sac (Fig. 66).

The glandular nature of the recesses in the human

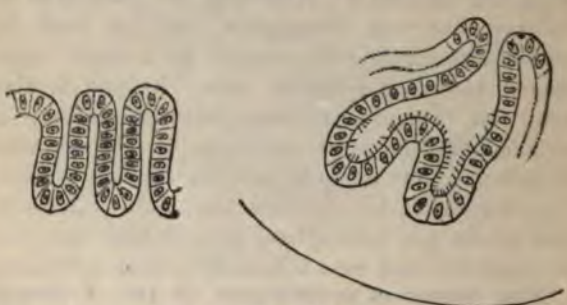

Fig. 66.—Simple forms of Glands.

Fallopian tube could not be settled without an appeal to the characters of the mucous membrane in the Fallopian tube of other mammals, and the corresponding section of the oviducts in lower vertebrata. Take, for instance, the elaborate work required of the mucous membrane in a bird's oviduct, not only for producing an albuminous investment for the egg, but the subsequent deposition of a calcareous coat exhibiting a definite structure. Yet the mucous membrane is simply thrown into longitudinal folds resembling the so-called rugæ or plicæ of the human Fallopian tube.

The simple construction of the mucous membrane in the avian oviduct is well calculated to excite

astonishment when compared with the internal lining of the oviducts of frogs, salamanders, lizards, and tortoises. In these animals the mucous membrane of the oviducts is richly beset with complex glands.

In many mammals the mucous membrane of the

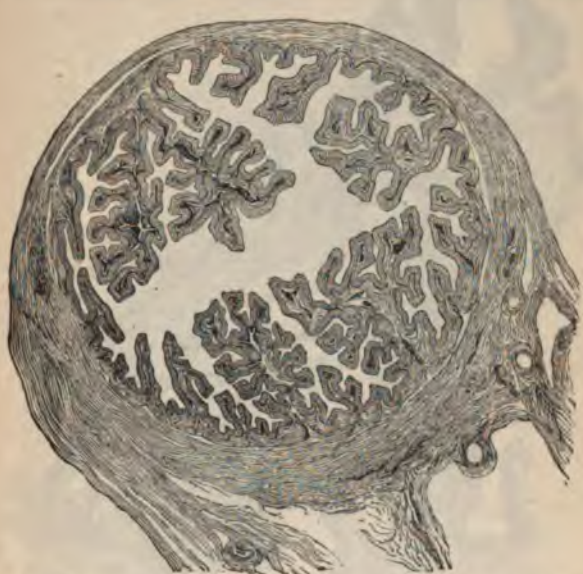

Fig. 67.—Transverse Section of the Fallopian Tube of a Macaque Monkey (*Macacus rhesus*).

tubes is far more complex than in the human female. The microscopic appearance of a transverse section of the tube from a Macaque (*Macacus rhesus*), taken from near the middle of the tube, is represented in Fig. 67.

It shows very well the cluster-like arrangement of the glandular acini, each presenting a single layer of large regular sub-columnar epithelium. An examination

of a large number of specimens shows that in the middle of the tube the mucous membrane is most complicated;

Fig. 68.—Recess of the Tubal Mucous Membrane of the Panolian Deer (*Cervus eldi*). (*Trans. Obstet. Soc.*)

in the section near the uterus it is simplest, and the number of acini, or recesses, varies with age. The

different sketches of the tubal mucous membrane given by various authors are thus explained.

The Fallopian tubes of ruminants are very thin and narrow ducts, but the mucous membrane reaches a high degree of complexity, and is richly beset with glands of a racemose type. A sketch of a recess from the tube

Fig. 69.—Transverse Section of the Fallopian Tube of a Woman. (After Schenck.)

of the Panolian deer (*Cervus eldi*) is given in Fig. 68. The recesses are lined with a single layer of regular columnar epithelium. These recesses are so numerous that as many as twelve may be counted in one section of a tube; they extend around the whole circumference. Mucous membrane as complex as this occupies the Fallopian tube of the Malay bear.

A very instructive sketch of the tubal mucous membrane of a woman is reproduced in Fig. 69, because it shows, from an independent worker, that these ridges

and folds are disposed in the tubes on the same principle as the glands in the uterus. The most instructive age at which to observe the Fallopian glands is in the tubes of the fœtus at birth. At this date they attain their greatest complexity, and specimens even more luxuriant than those shown in the drawing of the tubal mucous membrane of the Macaque (Fig. 67) are not infrequently found. The probable function of the Fallopian glands is to provide an albuminous fluid for the ovum as it traverses the Fallopian tube.

It is well to emphasise the point that the microscopical characters of the mucous membrane do not admit of any difference of opinion. The question is one of interpretation.

CHAPTER XX.

SALPINGITIS AND ITS EFFECTS: PYOSALPINX.

Salpingitis, or inflammation of the Fallopian tube, is nearly always secondary to inflammation of the genital tract.

The chief causes are septic endometritis, gonorrhœa, and cancer of the uterus; exceptional causes are tubercle and actinomycosis.

The changes in the tubes, induced by septic endometritis and gonorrhœa, are nearly identical, and the effects produced may be studied in four stages:—

1. *The acute stage, ending with closure of the abdominal ostium.*
2. *The modes by which the tube is closed.*
3. *Pyosalpinx and its effects.*
4. *Hydrosalpinx.*

First stage.—When inflammation extends from the vagina into the uterus, and passes into the tubes, the tubal tissues become soft, succulent, swollen, and friable. The fimbriæ are also swollen and succulent. When the tube is slit up, the mucous membrane will be found covered with glutinous pus. If the tube be gently squeezed before it is opened, a few drops of pus will exude from the ostium. Opportunities of examining tubes in this early stage have only occurred to me twice: once in a young prostitute, with gonorrhœa and sudden acute peritonitis beginning in the pelvis. The abdomen was opened and the tubes exposed; pus was seen dropping from their unclosed ends. The second case was

more severe. The mucous membrane rapidly became gangrenous. The case was that of a woman forty-three years of age, with a sloughing uterine myoma. The myoma was removed, but the septic mucous membrane necrosed. The necrosis extended to the mucous membrane of the tubes, and the dead tissue was found projecting into the peritoneum from the unclosed ostia of the tubes; it had set up rapidly fatal peritonitis (Fig. 70).

Second stage.—This commences with closure of the abdominal ostium: a process of great importance, and one that requires careful consideration. Doran* has clearly shown that the ostium may be occluded by perimetritis or salpingitis. Perimetritis indicates inflammation of the pelvic peritoneum. It may be secondary to salpingitis, endometritis, uterine cancer, or a solid tumour or cyst of the pelvis. One of its most constant effects is the formation of adhesions, due to organisation of inflammatory products, in the neighbourhood of the abdominal ostium of the tube. The method by which the tube is closed in perimetritis is very simple. Inflammatory matters effused among and in the tissues of the fimbriæ cause them to swell, adhere together, and often to the ovary. The effused material organises and binds the agglutinated fimbriæ to adjacent structures, such as the ovary, broad ligament, pelvic peritoneum, uterus, or rectum, and mechanically seals the ostium.

Salpingitic closure of the ostium is a slow but interesting process. It takes place in the following manner:—The Fallopian fimbriæ may be regarded as luxuriant protrusions of the mucous membrane beyond the ostium. When inflamed, they enlarge greatly. As the inflammation extends into the muscular coat of the tube, it becomes

* "On Closure of the Ostium in Inflammation and Allied Diseases of the Fallopian Tube;" *Trans. Obstet. Soc.*, 1890.

Fig. 70.—Section of a Uterus from which a Gangrenous Myoma had been removed. (*Trans. Obstet. Soc.*)

The mucous membrane had become gangrenous, and infective material had leaked into the peritoneum through the unclosed ostium.

lengthened, and gradually bulges over the fimbriæ, until the ostium presents a rounded orifice, instead of its usual fringed appearance. Eventually these rounded margins contract, narrow the orifice, and cohere, giving it a smooth, rounded end, not unlike a sea-anemone with its tentacles retracted (Fig. 71). On slitting up such a tube the fimbriæ will occasionally be found neatly folded up within it (Fig. 72).

The fimbriæ are not always so neatly retracted as in Fig. 72. A few of them may be nipped by the contracting ostium, and be left projecting (Fig. 73).

After closure of the ostium, pus or mucus will accumulate within the tube, for the inflamed mucous membrane obstructs the uterine orifice, and the intervening section will distend into a legume-shaped cyst, called hydrosalpinx or pyosalpinx, according to the nature of the retained fluid. Doran has pointed out—and my own observations are in complete harmony with his—that perimetritis, when secondary to salpingitis, will assist the latter process in occluding the ostium. In many specimens of salpingitic occlusion of the tube, a small pedunculated cyst is often present. Whether this is the so-called hydatid of Morgagni or a cyst arising in a Kobelt's tube, I am unable to decide.

Coincidently with occlusion of the ostium, other changes are taking place. As the tube enlarges when inflamed, it spreads out the two layers of the mesosalpinx, and often burrows between them towards the ovary. As the tube thickens it also lengthens; but, being held by the tubo-ovarian fimbria and the mesosalpinx, it will often become markedly tortuous. The majority of salpingitic tubes burrow between the layers of the mesosalpinx until the ovary and tube are in contact. This process is called "obliteration of the mesosalpinx." It is occasionally prevented by the connective tissue

Fig. 71.—Salpingitic Closure of the Ostium.

Fig. 72.—Salpingitic Closure of the Ostium.

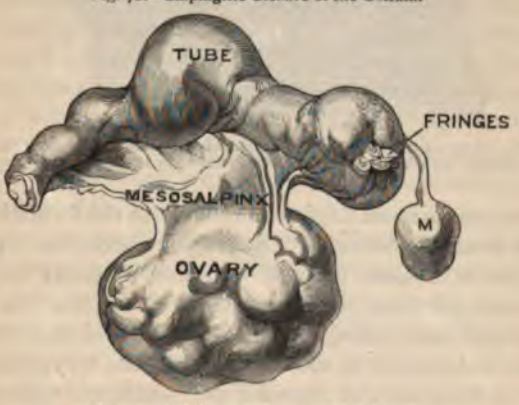

Fig. 73.—Salpingitic Closure of the Ostium.
M, A pedunculated cyst.

between the tube becoming infiltrated with inflammatory products. In some cases the tube and ovary are drawn together by adhesions, and on dividing these, the tube and ovary are easily separable. In such examples the mesosalpinx is merely crumpled, not obliterated. These

Fig. 74.—Transverse Section of the Tube and Mesosalpinx, in which the latter is infiltrated with inflammatory products, secondary to gonorrhœal salpingitis.

processes have an important relation to the formation of tubo-ovarian abscesses. Salpingitic occlusion of the ostium is a slow process, and this accounts for the frequent existence of perimetritis as a complication.

Before proceeding to discuss the gross changes which occur subsequent to closure of the abdominal ostium, it will be convenient to consider the minuter changes which characterise infective salpingitis. The most instructive

specimens are obtained from patients in whom salpingitis is secondary to gonorrhœa, and who have exhibited evidence of tubal disease for many months. On dividing the ampulla of such a tube, it will be found greatly thickened in all its coats—serous, muscular, and mucous—especially the last, which will often present a closely plicate arrangement, resembling the arbor vitæ of the cerebellum. When slightly magnified, the so-called plicæ of the tube are seen to be swollen, and almost fill the lumen of the tube, whilst the mesosalpinx is occupied by inflammatory exudation, in which the vessels seem to be firmly embedded (Fig. 74).

It is upon such tubes that the following remarks relative to cells and micro-organisms are mainly based.

Without assuming that it is proved that pus is always due to micro-organisms, there seems little room for doubt that gonorrhœa and septic endometritis are due to the presence of such bodies, and these two affections are the most frequent cause of salpingitis. When a healthy Fallopian tube is examined in transverse section by means of a microscope, we distinguish easily the serous and muscular coats of the tube, and, standing upon these, the so-called plicæ formed by the mucous coat. These plicæ consist of a delicate frame-work of connective tissue, fringed with columnar ciliated epithelium on the free surface. Delicate strands of unstriated muscle cells may be distinguished near the base of the epithelium, and in the middle of the fold are many capillaries. As a rule, a few leucocytes may be seen scattered among the meshes of the connective tissue. When sections are prepared from tubes which have been for some months the seat of salpingitis, the appearances are very different. The plicæ are swollen to twice or thrice the usual size, and all the details of their structure obscured by an innumerable host of cells of various sizes. In many places the limiting

epithelium is lost; in others it can be detected disturbed and disarranged, here and there seemingly held in position by some glutinous material. In mild cases this peculiar cell infiltration is limited, and does not involve the whole plica, but in very diseased specimens the cells are not limited to the plicæ, but involve the muscular coat, and extend into the connective tissue of the mesosalpinx (Plate IV.).

In order to more thoroughly investigate the nature of this cell infiltration, I selected some cases of salpingitis which had been under my care, and which I knew to be secondary to gonorrhœa. On removing the tubes, pieces were cut out and dropped into absolute alcohol within fifteen minutes of their abstraction by operation, and before they had lost their tissue life. After careful hardening, sections were stained in logwood, alum carmine, methyl violet, and the like. The appearances now to be described came out in clearest detail in the logwood preparations. In some specimens the cells were packed so closely as to produce a mosaic, but near the free borders of the plicæ the best opportunities occurred for distinguishing the contours of individual cells. The cells were of various size and shape; in most the nucleus was so large that on superficial examination it would be mistaken for the cell itself. On carefully focussing such a cell, under a moderate power ($\frac{1}{6}$ in.), a delicate ring of unstained protoplasm could be distinguished. Here and there cells with moderate nuclei and a large amount of unstained protoplasm were seen. These were not numerous. Under a high power ($\frac{1}{12}$ in. lens) the following facts were noted:—1. The greater proportion of the cells had large nuclei and a small rim of unstained protoplasm. Many of the nuclei contained three, four, and even six nucleoli, and sometimes an aster. 2. Others had a large elliptical nucleus, and in their general features resembled

Plate IV.—A Plica of the Tubal Mucous Membrane, in section. Highly magnified. (From a case of gonorrhœal salpingitis.)

The epithelium persists in the recesses.

the epithelioid cells so commonly seen in tubercle. The protoplasm of these cells contained granular bodies arranged in pairs, and collected in "groups of pairs," like the diplococci which have been described in gonorrhœal discharges. 3. The largest cells were nearly transparent, scarcely taking the stain, and with a circular nucleus small in proportion to the size of the surrounding protoplasm. These cells in nearly every instance contained groups of diplococci-like bodies. The characters of these cells are shown in Fig. 75.

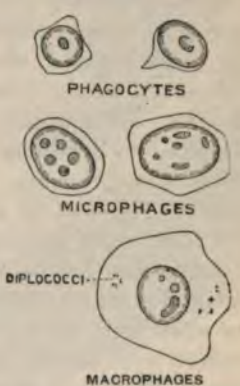

Fig. 75.—Aggressive Cells from the Mucous Membrane of a chronically inflamed Fallopian Tube.

The new and important light shed on the pathology of inflammation by the discovery of intracellular digestion tends to show that inflammation is in essence a struggle between irritant bodies of various kinds and leucocytes —a struggle which may be termed **amœbic warfare.** Since Metschnikoff made us acquainted with the aggressive powers of leucocytes and the "wandering cells of the mesoderm," many have confirmed his observations; and a recent contribution to this subject by Dr. Armand Ruffer, on the "Phagocytes of the Alimentary Canal," is of great interest. *Phagocytes*, or "fighting cells," are of two kinds. *Microphages*, mono- or poly-nucleated cells, are, as a matter of fact, large leucocytes. These have long been familiar to histologists as epitheloid cells. *Macrophages* are large mono-nucleated cells, also developed from leucocytes. Microphages and macrophages are each able to engulf and rapidly digest micro-organisms. Macrophages are able to engulf microphages

and destroy them. This apparently cannibalistic process seems to take place when the microphage is weakened.* The cells found in the infiltrated mucous membrane of a Fallopian tube secondary to gonorrhœa belong to these two types of aggressive phagocytes.

Pyosalpinx.—In severe cases of salpingitis after occlusion of the abdominal ostium, accompanied, as is usual, with obstruction of the uterine end of the tube, the pus is as securely locked up in the tube as it would be in a deep-seated abscess, and it follows the course of an abscess. The walls of the tube, stretched by the accumulating pus, gradually thin, and the inflamed tube becomes adherent to surrounding structures—ovary, uterus, rectum, intestine, or broad ligament. The wall of the tube continues to thin until, on some slight exertion, it bursts. If the pus be discharged into the peritoneal cavity, it establishes rapidly fatal infective peritonitis. Left pyosalpinx is very prone to open into the rectum. When a pyosalpinx lies in contact with bowel, the pus it contains becomes fœtid, due to diffusion of intestinal gases.

The accumulation of pus in the Fallopian tubes leads sometimes to great distension, so that they become converted into legume-shaped cysts, measuring 16 cm. in length, and 10 cm. in circumference. Such tubes will rise out of the pelvis, and form tumours rising above the pelvic brim, and even reaching as high as the umbilicus. A large pyosalpinx has often been mistaken for an ovarian cyst. Fallopian tubes of this size are contained in a serous capsule formed by the thickened tissues of the broad ligament.

When examined microscopically, the true tissues of

* *Quarterly Journal of the Microscopical Society*, vol. xxx. part 4, February, 1890.

the tubes are found distended and thinned, except i places where they are infiltrated with inflammatory pr ducts.

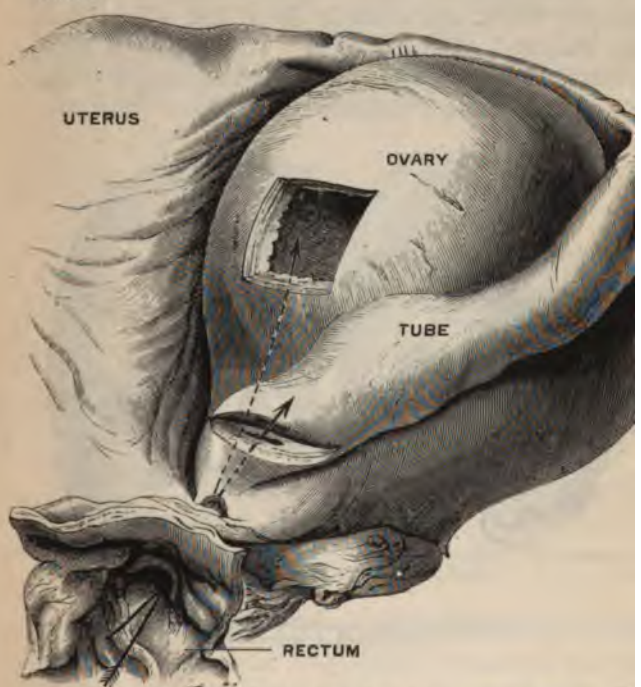

Fig. 76.—Large Pyosalpinx.

The tube communicates with an abscess in the ovary (tubo-ovarian abscess), and ea communicates with the rectum.

This alteration in the tissues is sufficient to distinguis them from distension of bicornuate uteri, which are som times confounded with them.

The Museum of the Royal College of Surgeon contains two specimens which illustrate this very wel They are two cysts, resembling huge legumes: they hav

thick muscular walls (Fig. 77). At the time of removal the right one weighed seventy-five and the left one twenty-two ounces. Each contained thick mucus. Sir Spencer Wells, who removed them, believes that they are distended Fallopian tubes. The patient, a young woman, recovered from the operation, and has continued to menstruate regularly ever since.

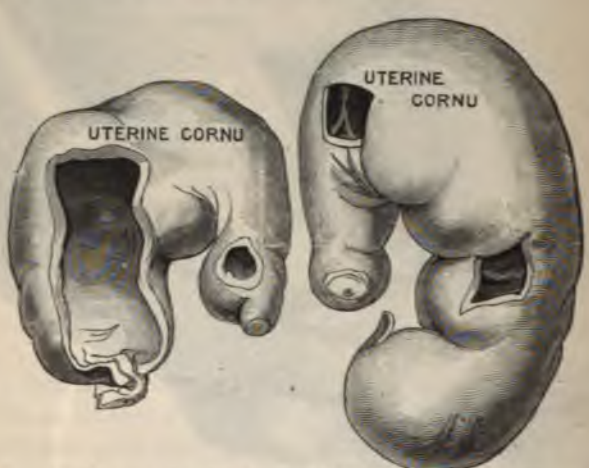

Fig. 77.—Two legume-shaped Cysts supposed to be Fallopian Tubes. (Museum Royal College of Surgeons.)

It is a fact important to be remembered that when a Fallopian tube becomes distended not only by fluid accumulations, but by an impregnated ovum developing within it, the walls of the tube gradually thin. In this respect the tubes are in striking contrast with the uterus. Whenever the uterine cavity becomes distended by a developing embryo, the accumulation of retained mucus, or a myoma projecting into it, the uterine tissue hypertrophies. This is true not only in the case of the human

uterus, but also in that of mammals generally. It frequently happens with bicornuate uteri that the cervical canal becomes obstructed, leading to retention of secretions in one or both cornua—a condition known as *hydrometra* when the retained fluid is mucus, and *pyometra* when the fluid is purulent. An example of hydrometra from a ewe is sketched in Fig. 78.

Fig. 78.—Uterus of a Ewe distended with Mucus: Hydrometra. (Museum, Royal College of Surgeons.)

In all such specimens the distended cornua had thick muscular walls; in all the examples of distended Fallopian tubes that I have examined the walls of the tubes were thin, except here and there where the walls were infiltrated with inflammatory exudation.

With these facts for our guidance, let us look anew at Fig. 77, and restore the legume-shaped cysts to what we may fairly believe to have been their original position (Fig. 79). It will be seen that these supposed Fallopian tubes are dilated uterine cornua, and the woman from whom they were removed had probably a bicornuate

uterus, and, as in the case of the ewe, there had been some stenosis of the cervical canal, or at any rate obstruction to the free escape of secretion which, being retained, led to their distension. I am persuaded that several specimens described as large distended tubes, in which the

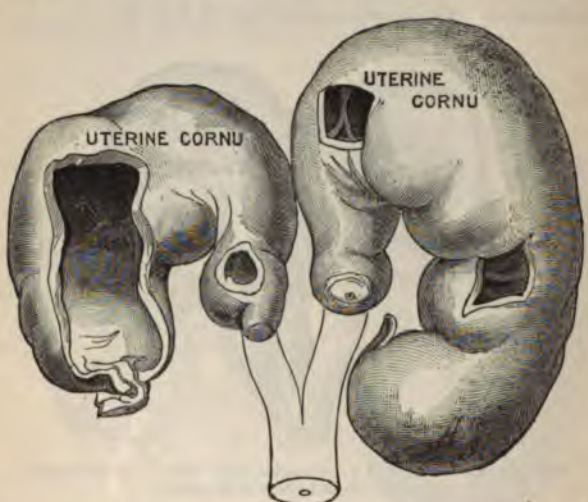

Fig. 79.—The two supposed Fallopian Tubes (Fig. 77) restored to their probable natural relationship.

walls were thick and muscular, were really examples of hydrometra or pyometra in bicornuate uteri.

The want of care in distinguishing between elongated uterine cornua and Fallopian tubes has been a fertile source of error in the comparative physiology, as well as the comparative pathology of the uterus and Fallopian tubes.

The tube does not dilate in all cases of salpingitis : in some the walls are infiltrated with inflammatory products,

and become thick and succulent; but in such tubes the muscular and mucous tissues are destroyed.

Pyosalpinx in uterine cancer.—Distension of the Fallopian tubes not infrequently accompanies cancer of the uterus, and in a certain proportion of cases precipitates the final event by rupturing and producing peritonitis. To Dr. J. K. Fowler* we are indebted for this addition to our knowledge. In *A Contribution to the Pathology of Hydro- and Pyo-salpinx* he describes briefly fifteen examples which he met with in the course of three years in the *post-mortem* room of the Middlesex Hospital. Of these, pyosalpinx was associated with uterine cancer in two instances. In one fatal peritonitis was induced by rupture of the pus-containing tube. Dr. Fowler's description is:—"The right Fallopian tube was distended to the size of an ordinary sausage, and contained a quantity of pus. Its walls were considerably thickened; the internal orifice was closed. At the fimbrial extremity the tube had burst into the cavity of the peritoneum. The left tube was normal." Under the heading "Remarks," we find the following:—"This case is interesting from the fact that, although the patient was suffering from cancer of the uterus, death was due to peritonitis, the result of rupture of the dilated tube."

The records of the Middlesex Hospital, embodied in the *Reports* annually prepared by the pathologists who have succeeded Dr. Fowler, contain confirmatory observations, and indicate that pyo- and hydro-salpinx complicate uterine cancer in the proportion of not less than ten per cent.

* *Medical Society's Proceedings*, London, vol. vii. p. 441.

CHAPTER XXI.

TUBO-OVARIAN ABSCESS—HYDROSALPINX—HÆMATOSALPINX.

In this chapter the effects of salpingitis will be studied when the inflammation extends to and involves the ovary, as well as the abnormal conditions of the tube which follow upon complete occlusion of the ostium.

Oöphoritis secondary to infective salpingitis.—When the inflammatory process extends to the peritoneum in chronic cases of salpingitis, it is sure to involve the ovary.

The first effect is to cause thickening of its capsule, and if lymph is effused upon its surface, this may organise, and extensive perimetritic adhesions result. The effects of this thickening of the capsule are two-fold. At first it prevents the rupture of ripe ovarian follicles, and the tension gives rise to considerable disturbance and causes pain; as the enlarged follicles cannot discharge their contents, it naturally follows that on section an ovary which has long been the seat of perioöphoritis will be found largely converted into cystic spaces, and two or more may become confluent, and form a cyst the size of a walnut. As such a cyst enlarges and makes its way by absorption to the surface, it not unfrequently comes into relation with, and adheres to, the dilated pus-containing ampulla of the corresponding tube, which has been brought in contact with it through the restraining influence of the tubo-ovarian ligament, or by direct adhesion: for the ovary and tube are in contact. Except that the

tube and ovary become bound together, no further change ensues in the majority of cases, but not infrequently absorption takes place, and the dilated ampulla of the tube will communicate with an enlarged follicle or cyst in the ovary, and thus give rise to a tubo-ovarian abscess. The communication in such cases is usually

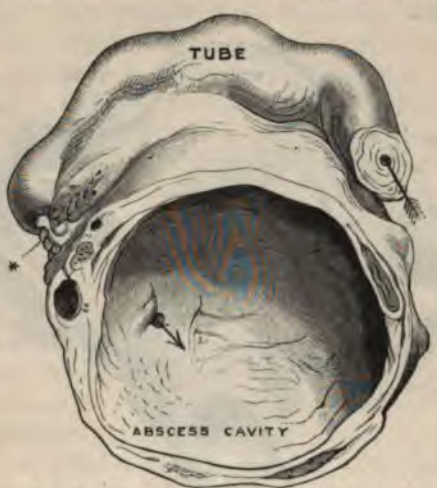

Fig. 80.—Tubo-Ovarian Abscess, secondary to Gonorrhœa.
* Adherent fimbriæ.

small, and barely admits a probe (Fig. 80). I have had many opportunities of dissecting such specimens. When a pyosalpinx or a tubo-ovarian abscess communicates with the rectum, the pus is discharged by way of the anus at irregular intervals, and is accompanied by great improvement in the patient's symptoms. When a tubo-ovarian abscess communicates with the rectum, it is the portion of the abscess lodged in the ovary that usually becomes the seat of fistula (Fig. 76).

It is worth noting that in tubo-ovarian abscesses the

abdominal end of the tube is occluded. Up to the present time I have not met with an exception to this rule. This indicates that the primary trouble is in the tube Pyosalpinx occurs frequently without an ovarian abscess. When ovarian abscess occurs independently of salpingitis, my observations lead me to believe that it is generally tubercular.

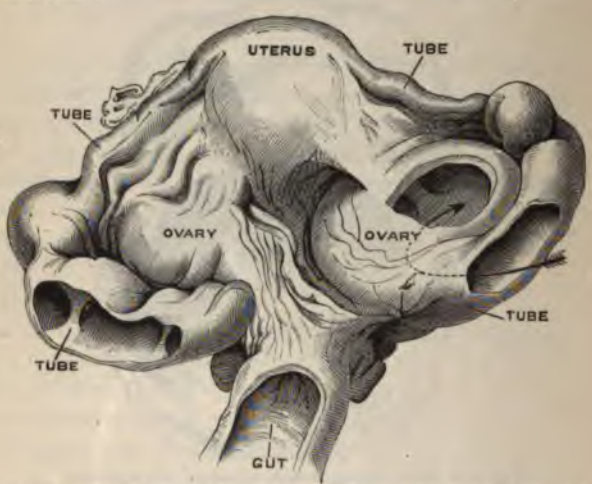

Fig. 81.—Tubo-Ovarian Abscess. (Museum, Royal College of Surgeons.)

Hydrosalpinx.—The persistent course of salpingitis leading to occlusion of the ostium, though very frequent, does not occur in all cases. Many mild attacks may be conveniently described as "catarrh of the tube," and, like a nasal or gastric catarrh, subside and leave no trace. When the inflammation is sufficiently intense to seal the ostium, permanent damage results, and if, as is so commonly the case, both tubes are affected, they remain throughout life functionless, and often a source of grave danger. In cases of salpingitis sufficiently severe to

occlude the ostium, the tube is, after the subsidence of the inflammation, in the condition of a blocked ureter; there is no escape for the fluid which is excreted by the glands in its walls, or for the fluid which passively exudes into its cavity. It consequently forms a cyst by retention. The contained fluid is more or less colourless; sometimes it has a greenish tinge, due to the presence of cholesterine. Frequently it is the colour of chocolate. This condition is termed *hydrosalpinx*, and may be defined as *a Fallopian tube, distended with fluid in consequence of inflammatory occlusion of its abdominal ostium.* The changes that arise in the occluded and distended tubes are such as we are familiar with in the case of the gall-bladder, vermiform appendix, or pelvis of the kidney, when they become cysts by retention. The first effect of the accumulating fluid upon the walls of the tube is to stretch them; this continual pressure induces atrophy, the pathological sequence. The epithelium and mucous membrane become thin and atrophied until nothing but a thin-walled transparent cyst remains, with delicate ridges, representing all that is left of the longitudinal plicæ of the tubal mucous membrane. The shape of a typical hydrosalpinx is very characteristic, and though not invariable, is fairly constant; it resembles a legume with somewhat blunt ends; the ovary always occupies the concave border of the legume, and the bent shape of the cyst is doubtless due to the traction exercised by the tubo-ovarian fimbria or ligament. In some specimens the situation of the ostium is indicated by a depression, from which a series of folds radiate, as in Fig. 82, reminding us of the ridges and furrows on the face of a stump after a circular amputation through the thigh or arm. In hydrosalpinx the tubes rarely attain a large size. This is due to the fact that as the tube distends the mucous and muscular coats atrophy. The largest examples of

hydrosalpinx which have come under my observation have not exceeded 16 cm. in length, with a diameter of 8 cm. The walls of these cysts were so thin that the fluid probably leaked through them in the same way that it exudes from a very tense ovarian cyst with

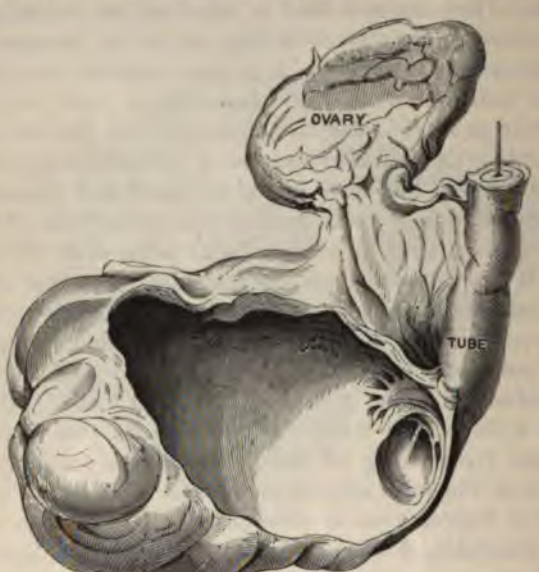

Fig. 82.—Hydrosalpinx. (Museum, St. Thomas's Hospital.)

attenuated parietes, and is gradually absorbed by the peritoneum. So thin are the walls in some of these hydrosalpinges, that even when very carefully manipulated during operation, they rupture; it is very probable that these dilated tubes may cure by spontaneous rupture, the cyst walls afterwards atrophying. We know too well that such an event sometimes terminates the course of a pyosalpinx, by setting up fatal peritonitis; but the fluid

of a hydrosalpinx would be tolerated by the peritoneum in the same way that it tolerates fluid from parovarian cysts when they spontaneously rupture. My reasons for such an opinion are founded on the following evidence. I have had many opportunities of making *post-mortem* examinations of the bodies of prostitutes, many of them having led a life of vice of the lowest form. In most of

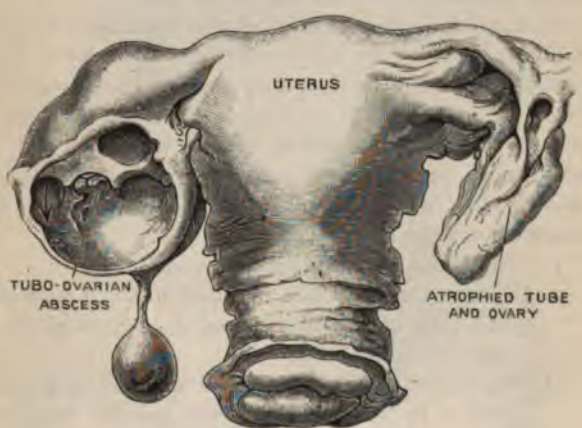

Fig. 83.—Uterus of a Harridan.

them double hydro- or pyo-salpinx existed. In three instances in which I examined the bodies of harridans I found one or both Fallopian tubes represented by an impervious cord, and the ovaries atrophied and unrecognisable. This induces me to believe that the frequency of tubal disease between the age of twenty and thirty-five years, and its relative rarity after the fortieth year, are to be accounted for by the fact that if the individual survive the dangers incidental to an inflamed and distended tube the diseased parts atrophy. The process is illustrated by the specimen represented in

Fig. 83. It is the uterus and appendages of a harridan, aged forty-four. She has been for many years known to the police as a notorious prostitute. The uterus was shrivelled, the right ovary and tube represented by thin impervious bands of tissue. The left tube and ovary are represented by a small tubo-ovarian abscess, containing a small quantity of colourless fluid, and, in the recess formed by the ovary, some caseous material.

Anatomical evidence indicates that when the infective qualities of the pus are not very great, a pyosalpinx may resemble a chronic abscess, and give rise to few symptoms. It is this form of pyosalpinx which I believe becomes slowly and passively dilated with fluid, and is transformed into a hydrosalpinx. My reasons for believing that a hydrosalpinx is often a late stage of pyosalpinx may be summarised thus :—

1. Hydrosalpinx is not found in acute cases.
2. In many chronic cases hydrosalpinx is found on one side of the uterus, and a progressive pyosalpinx on the other.
3. The ampulla of a tube will sometimes be dilated into a hydrosalpinx, and the isthmus contains pus.
4. The fluid contained in a hydrosalpinx will sometimes be colourless, but the recesses of the tube contain caseous material and cholesterine.
5. The dilated tube in hydrosalpinx may, as in pyosalpinx, communicate with an enlarged ovarian follicle to form a tubo-ovarian cyst.

It is well known that ovarian cysts are prone to undergo axial rotation, and in some instances the torsion may be so severe as to detach the cyst from its connections. Axial rotation occurs in connection with hydrosalpinx. The only specimen known to me occurred in the practice of my colleague, Mr. Henry Morris. I

assisted at the operation, and was able to observe the condition thoroughly.

The cyst was a typical hydrosalpinx. The fluid

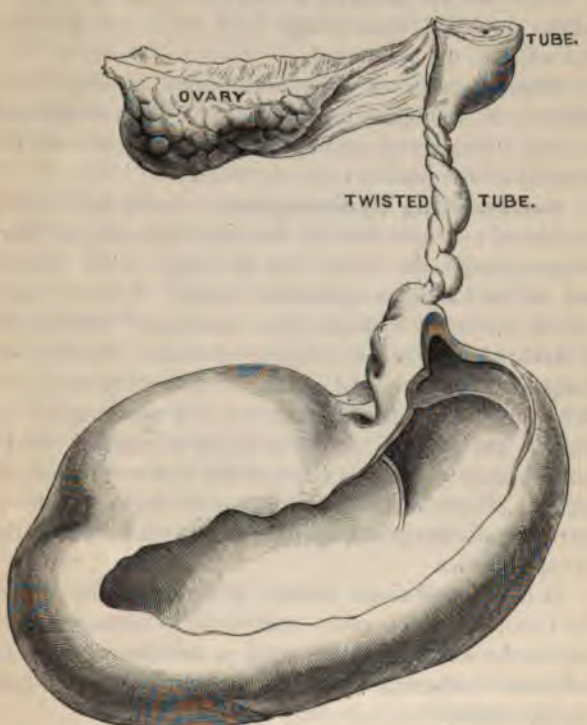

Fig. 84.—Hydrosalpinx with Twisted Pedicle.

contents were of a chocolate colour. The portion of the tube intervening between the cyst and uterus was tightly twisted three times and a half. The cyst wall was adherent by strong adhesions to the adjacent parts of the mesometrium and pelvic peritoneum, and it doubtless received

its nutrient vessels from this source, for its relations with the blood-vessels which normally supply this part of the tube were thoroughly cut off.

Veit * briefly mentions a case of *torsion* of a hydrosalpinx in which hæmorrhage took place into the cyst, and refers to my specimen.

When ovarian or parovarian cysts undergo axial rotation, the Fallopian tube is necessarily involved, and in cases where actual separation occurs it is usually the last part of the pedicle to be detached.

Intermitting hydrosalpinx.—It has been stated on clinical evidence that the fluid in a hydrosalpinx may escape through the uterus, the blockade of the uterine end of the Fallopian tube being raised. Such a condition is termed "hydrops tubæ profluens," the escape of fluid taking place at irregular intervals. Profuse discharges of pus and fluid occur in connection with pyo- and hydro-salpinx, accompanied by a diminution in the size of the tumour, and are easily accounted for by the formation of a fistula between the cyst and rectum, or vagina. There is no trustworthy pathological evidence that these discharges escape into the uterus by way of the Fallopian tubes.

It is a fact of some interest that the uterine end of the Fallopian tube is rarely obliterated in salpingitis. Of course, the tumidity of the mucous membrane would be sufficient to obstruct the passage of fluid from the tube into the uterus.

The discharge of watery fluid from the uterus in gushes is as yet without an explanation. Skene Keith† has recorded a curious example which occurred in an unmarried lady thirty-six years of age. She had suffered

* *Centralblatt für Gyn.*, May 30th, 1891.
† *Lancet*, May 2nd, 1891, p. 985.

from the age of twenty years from discharges of fluid from the uterus, which were so profuse as to render it necessary to have her dresses lined with waterproof cloth, and every night her bed had to be made up as for a confinement. The discharge was thin, had a heavy sickly odour, and was like dirty water.

At last, to remedy the condition, the ovaries and tubes were removed, but nothing was found to account for the fluid.

This remarkable case makes it clear that gushes of watery fluid from the uterus must not by themselves be accepted as evidence of intermitting hydrosalpinx. (*See also* page 284.) I pointed out, in describing ovarian hydrocele, that they occasionally intermit; hydro- and pyo-salpinx may, but at present there is no trustworthy evidence based on anatomical facts that the fluid contained in such cysts escapes through the tubes into the uterus.

It is a fact that in the majority of distended tubes, even in severe cases of hydrosalpinx—the uterine end of the tube is obstructed but not occluded.

It will be an advantage to define here, briefly, the terms applied to the various pathological conditions of the tube :—

1. *Pyosalpinx.*—The tube is distended with a pus or purulent fluid.
2. *Hydrosalpinx.*—The tube is distended into cyst which contains fluid: in some specimens clear and albuminous, in others of a chocolate colour, and in old specimens flakes of cholesterine are present.
3. *Tubo-ovarian cyst.*—The ovary is replaced by a cyst which communicates with a distended tube. The orifice of communication is an adventitious opening, and does not represent the abdominal ostium of the tube.

4. *Tubo-ovarian abscess.*—Anatomically, this is a tubo-ovarian cyst, but it contains pus, and the cyst walls are very thick. The orifice of communication is usually small and barely capable of admitting a probe.

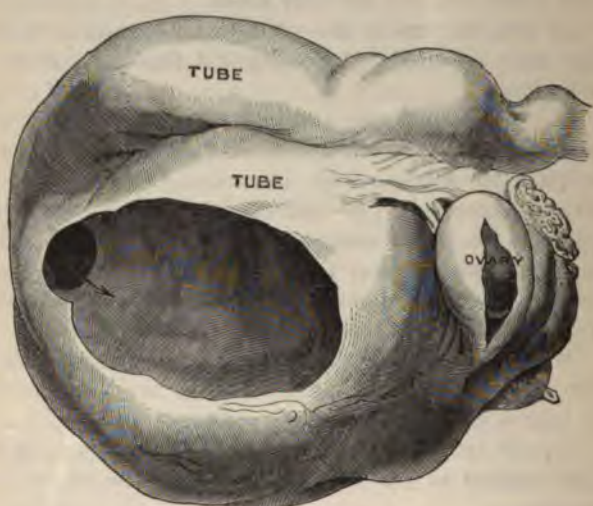

Fig. 85.—Hydrosalpinx.

5. *Ovarian hydrocele.*—The tube opens by its abdominal ostium into a cyst. The ostium is recognised in rare cases by the presence of fimbriæ; more frequently by longitudinal ridges, which emerge from the walls of the tube and radiate over parts of the cyst wall adjacent to the ostium. The ovary is either incorporated in the cyst wall or projects into the cavity of the cyst.

Often it is exceedingly difficult to decide to which group a given specimen belongs. For example, if in

Fig. 85 we had not the ovary to guide us, it would be difficult to decide between an ovarian hydrocele, tubo-ovarian cyst, or hydrosalpinx.

Frequency of chronic salpingitis.—Distended and purulent tubes are very frequently found during *post mortem* examinations of individuals in whom the existence of such conditions was not suspected during life. It should be remarked that distended tubes are very rarely noted unless special attention is directed to the pelvic organs. Two sets of observations bearing on this question have been published. The first was the communication to the Medical Society of London by Dr. Fowler,* to which reference has already been made. He found in the course of three years fifteen examples of dilated Fallopian tubes. The second one was Dr. Lewer's† paper, read at the Obstetrical Society, London, entitled, *On the Frequency of Pathological Conditions of the Fallopian Tubes.* He found in one hundred consecutive dissections of the pelvic organs in females, examined in the *post mortem* room of the London Hospital, no fewer than seventeen instances of dilated Fallopian tubes.

Hydro-peritoneum and tubal disease.—It has been frequently pointed out that one important advantage accruing to the individual from occlusion of the abdominal ostium of the tube in septic salpingitis is great diminution in the risk of the inflammation extending to the peritoneum. Apart from this, even mild forms of tubal catarrh, not sufficient to give rise to fatal peritonitis, nor even severe enough to seal the ostium, may cause what is called hydro-peritoneum. Mr. Alban Doran‡ has especially investigated this condition, and discussed its probable

* *Medical Society's Proceedings*, vol. vii. p. 441 ; 1885.

† *Trans. Obstet. Soc.*, vol. xix. p. 199 ; 1887.

‡ "Papilloma of the Fallopian Tube and the relation of Hydro-peritoneum to Tubal Disease ;" *Trans. Obstet. Soc.*, 1886, vol. xxviii.

causation in an admirable paper communicated to the Obstetrical Society of London. Hydro-peritoneum he defines as a collection of fluid in the peritoneal cavity which cannot be referred to any tangible organic disease. By this we may presume he means that the accumulation is not due to the ordinary causes of ascites, such as heart, liver, or kidney disease. The definition is purely clinical. Mr. Doran is of opinion that hydro-peritoneum is caused by salpingitis of a mild type with an unobstructed tube. It is easy to understand that the constant irritation caused by inflammatory products dripping from the tube into the peritoneal cavity would induce an exudation of fluid. The subject is one of some importance, and demands more attention than it has yet received at the hands of those who conduct *post mortem* examinations. Its clinical import is obvious enough.

Hæmatosalpinx.—Fallopian tubes are frequently found dilated, as in hydrosalpinx, but filled with blood-clot. This condition is *hæmatosalpinx*—a term often employed very loosely. Recent observations serve to show that those dilated tubes to which the term most strictly applies are in very many instances gravid. In a small proportion of the specimens it is exceedingly difficult to decide between hæmorrhage into a previously dilated tube and an early tubal pregnancy. My observations convince me that nearly all the specimens supposed to be examples of hæmatosalpinx are really gravid tubes, from the fact that in all the cases that have occurred in my own practice in which dilated Fallopian tubes contained blood-clot, a careful examination of the parts has led to the detection of an embryo, an apoplectic ovum, or chorionic villi.

In similar specimens submitted to me for investigation by other surgeons, I have, in nearly all cases, succeeded in detecting evidence of the presence of an impregnated ovum.

Many museum specimens, supposed to be examples of hæmatosalpinx, are examples of very early tubal pregnancy. This question is fully discussed in the section devoted to tubal gestation. The term *hæmatosalpinx* should be exclusively reserved for Fallopian tubes in which the abdominal ostium is closed, and the dilated portions occupied by clot, in which no evidence of pregnancy, such as an embryo, apoplectic ovum, or chorionic villi, is detected.

It must be remembered that neither a dilated tube filled with chocolate-coloured fluid nor an undilated tube containing free blood is a hæmatosalpinx.

As far as my observations go, a dilated Fallopian tube containing blood, and its abdominal ostium unclosed, will, in nearly all cases, be found gravid, if carefully investigated. It might also be said that only two conditions lead to tubal distension with an unclosed ostium; these are the retention of an impregnated ovum and a growth (adenoma) within the tube.

Even in gravid tubes in which the pregnancy has produced no cataclysm until the ostium has become occluded, a practised eye quickly detects the difference in the mode of closure. The occlusion of the ostium in salpingitis betrays full evidence of the inflammatory changes characteristic of the disease.

Sterility of strumpets.—Many have asked the question, "How is it that strumpets are so often sterile?" It is said that the question was answered many years ago by Morgagni, who correctly associated it with occlusion of the tubes as a consequence of inflammation extending from the vagina. I have looked carefully through his letters, but have failed to find any direct statement on this matter. The sterility of strumpets has long been known; it is indicated in Hosea iv. 10. An inquiry into the history of prostitutes shows that many of them have

fallen from virtue and given birth to a child before they began a life of systematic prostitution. It is equally certain that many professed strumpets are permanently sterile because inflammatory affections, such as vaginitis or gonorrhœa, are soon communicated to them, and the tubes become sealed.

Very early in my pathological investigations I used to seize opportunities of conducting *post mortem* inspections in a parish mortuary, and satisfied myself that the explanation of the sterility of strumpets attributed to Morgagni is the correct one.

CHAPTER XXII.

CATARRHAL SALPINGITIS IN RELATION TO ADENOMA OF THE NECK OF THE UTERUS.

THE mucous membrane of the Fallopian tubes is liable to inflammation of a mild type, conveniently termed *catarrh*, which causes it to become more vascular and tumid, and at the same time increases the amount of secretion furnished by its glandular recesses.

The tumidity of the mucous membrane leads to tem porary obstruction of its lumen, and the distension of the tube consequent on the retention of increased secretion produces a considerable amount of discomfort, sometimes amounting to actual pain.

Catarrh of this mild type is apt to be recurrent, and is often confounded with oöphoritis, or the more serious forms of salpingitis.

In a fair proportion of cases it is associated with, if not actually secondary to, adenoma of the neck of the uterus : the condition known by the ridiculous term of *erosion*.

The mucous membrane of the neck of the uterus consists of two portions : one lines the cervical canal, and is continuous with the mucous membrane of the uterine cavity ; the other covers the *portio vaginalis*, and is a prolongation of the mucous lining of the vagina. The two portions meet at the external os. The mucous membrane covering the vaginal portion of the cervix "is really cup of stratified epithelium, resembling a tailor's thimble which fits on the lower end of the uterus proper" (Williams)

It contains a few simple glandular crypts. The cervical mucous membrane is beset with many racemose glands, and the epithelium is of the columnar variety.

The glands of the cervical mucous membrane frequently become the seat of adenoma, which invades the mucous membrane of the vaginal portion, forming a soft velvety areola around the os. This tissue resembles in colour a ripe strawberry, and is thickly dotted with minute spots of a brighter pink. The surface is usually covered with tenacious mucus. The os is patulous, and the soft spongy material extends up the cervical canal. This pink tissue is composed of glandular acini, lined with large and very regular columnar epithelium.

Fig. 86. — Pedunculated Adenomata of the Cervical Canal.

In the rarer variety the adenoma projects in the form of a polypus from the os; occasionally two or more may be present. They are soft to the touch, and dotted over with minute pores. They are attached to the cervical mucous membrane, near the os, which is markedly patulous when these pedunculated adenomata are present (Fig. 86).

Histologically, they are composed of an axis of fibrous and muscle tissue, covered by mucous membrane directly continuous with that lining the cervical canal. As long as these pedunculated tumours remain within the canal the mucous membrane covering them possesses a single layer of columnar epithelium and glands, but when the tumour increases in size and projects into the

vagina, the portion which is no longer within the cervical canal loses its glands and the columnar epithelium becomes converted into the stratified variety characteristic of the *portio vaginalis*. As these outgrowths rarely attain a large size, sections may be easily cut through their whole length, and the change from columnar to stratified epithelium readily studied.

Another important fact, and one frequently overlooked, is that these adenomatous changes are not by any means confined to the neighbourhood of the external os, but in many cases involve the mucous membrane throughout the whole length of the cervical canal.

As the cervix of the human uterus is difficult to obtain in a condition fit for preparing trustworthy sections for the microscope, Mr. Gordon Brodie kindly assisted me in investigating the minute structure of adenomata occurring in the cervical canal of monkeys.

When discussing *menstruation* it was pointed out that Macaque monkeys, when living in confinement, menstruate in the same fashion as women. Whilst conducting a series of observations to determine, if possible, the menstrual rhythm, it became clear that these monkeys, like women, are liable to irregularities in the duration, amount, and sequelæ of this extraordinary phenomenon. Systematic observations carried out in Macaques showed that they are liable to menorrhagia and leucorrhœa. As occasions offered, monkeys with profuse leucorrhœa were killed, and the genital organs examined. The naked-eye characters of the cervix uteri (Fig. 87) were identical with those exhibited by the cervix uteri of women affected with adenoma (erosion). The mucous membrane of the cervical canal was tumid, and projected beyond the os like a mass of granulations. The projecting mass is of a florid red colour during life, but is quite pale after death. This spongy tissue extends throughout the

cervical canal, and often forms rounded prominences in the canal. The whole of this spongy mass is dotted with circular pores, from which mucus readily exudes, and in large quantities, on the slightest pressure.

When a cervix affected with adenoma is obtained quite fresh and carefully hardened, very instructive sections can be prepared from it, if they are cut in the long axis of the cervix, and in such a way as to include the external os, the cervical canal, and portio vaginalis.

Fig. 87.—Cervix Uteri of a Macaque Monkey, with Adenoma (erosion).

The microscopical appearances are shown under a low power in Fig. 88. The soft material protruding from the os, as well as polypoid projections in the canal, possess the glandular type of structure so characteristic of the cervical adenoma of women. The acini, or recesses, of these glandular masses are lined with a single layer of large regular columnar epithelium, and the cavity is often found filled with mucus. So large are these cells, that rows of them are seen in some of the sections cut at right angles to their long axis, producing a peculiar honeycomb-like appearance.

These recesses develop in the same manner as glands: that is, by solid down-growths of cells derived from the surface epithelium, which subsequently acquire a central lumen. This process may be studied near the margin of the external os, where the cervical glands encroach upon the portio vaginalis.

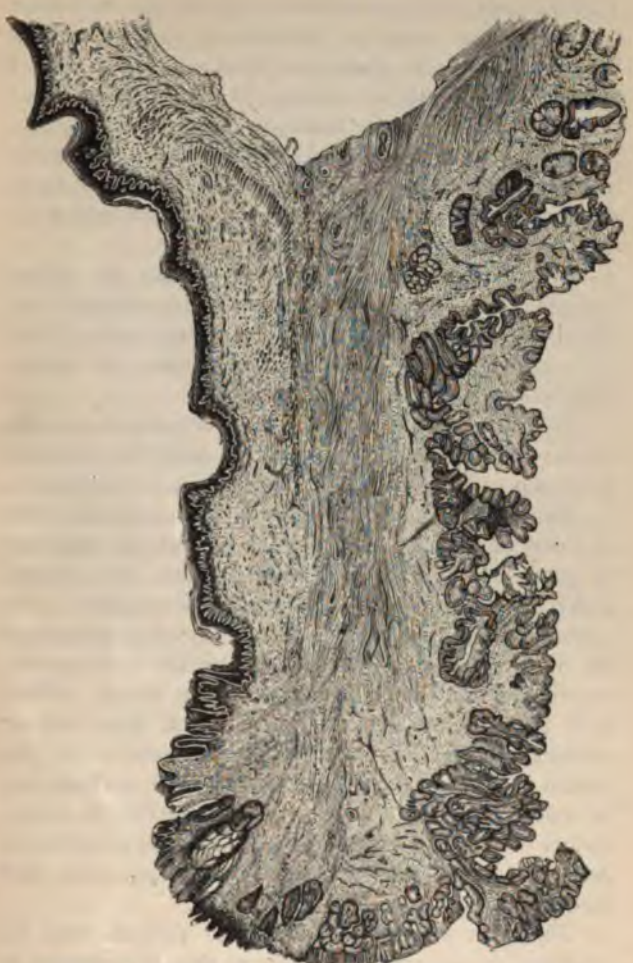

Fig. 88.—Sagittal Section of the Cervix Uteri of a Macaque Monkey affected with Adenoma. Under a low power.

The study of this condition of the mucous membrane in the cervical canal of monkeys is very instructive, because it serves to show that the change is not limited to the parts immediately adjacent to the os, but involves in severe cases the entire canal; it also indicates that the profuse mucoid or leucorrhœal discharge so constantly attendant on this condition in women, as well as in monkeys, is altered secretion furnished in morbidly large quantities by the aberrant glands.

It was further found that severe forms of cervical adenoma in monkeys were associated with enlarged and tumid Fallopian tubes, and in a few instances the tubal mucous membrane presented outgrowths resembling papillomata.

The facts obtained from a study of adenoma of the uterine cervix in monkeys led me to study the condition in women, especially in its possible relation to salpingitis.

Many cases of dysmenorrhœa are associated with adenoma of the cervix in women beyond any suspicion of gonorrhœa. Several such cases have been placed under my care for the purpose of oöphorectomy. On examining these patients, the adenomatous condition of the os is recognised, and irregular tender swellings can occasionally be felt on each side of the uterus. When such patients are kept resting in bed, these tender swellings will subside, and often re-appear when the patient moves about. These tender pelvic swellings are in many instances Fallopian tubes swollen in consequence of catarrhal conditions of the mucous membranes. As the inflammation subsides, the swelling, pain, and tenderness vanish.

The pain experienced by these patients may be explained on the same principles as that experienced in relapsing appendicitis. The tumefaction of the mucous membrane temporarily obstructs the communication

between the appendix and the cæcum; this leads to distension of the appendix, in consequence of the accumulation of mucus furnished by the glands, and, in some cases, inflammatory products. The distension of an obstructed appendix causes pain.

As soon as the inflammation subsides sufficiently to allow the blockade to be raised, tension is relieved by the escape of the retained fluid into the cæcum.

This matter has been considered somewhat in detail, because localised tender swellings on each side of the uterus are frequently diagnosed as cases of oöphoritis. Such a diagnosis is based merely on clinical observation, not on anatomical evidence. On the other hand, we have specimens which absolutely support the view that distension of an occluded mucous canal is invariably accompanied by intense pain and tenderness.

My clinical and pathological inquiries have led me to the conclusion that many cases diagnosed as oöphoritis are really instances of catarrhal salpingitis, and in a certain proportion of patients are associated with, and in some instances secondary to, adenoma of the mucous membrane lining the cervical canal.

CHAPTER XXIII

TUBERCULOSIS AND ACTINOMYCOSIS OF THE OVARY AND FALLOPIAN TUBE.

Our knowledge of tuberculosis of the ovary and Fallopian tube is not very satisfactory. This is due to the fact that in most of the recorded cases the diseased parts have not been subjected to careful microscopic examination. It has been shown very clearly that however suggestive the naked-eye appearances may be, the lesions cannot be regarded as tubercular unless tubercle bacilli are found. When the disease in the ovary or tube is part of a general infection, the detection of tubercle bacilli in any of the affected organs may be reasonably used as evidence that caseous foci in the ovary or tube are also tubercular.

This is well shown in Dr. Percy Kidd's paper, *On the Distribution of the Tubercle Bacilli in the Lesions of Phthisis.** In this inquiry ninety cases were investigated. Of these, twenty-three were females. In two the Fallopian tube contained caseous material, but only in one case were bacilli recognised. The report of this case (No. 88) runs thus :—

"*Jane M. : Phthisis.*—Fallopian tube distended with firm caseous matter. Bacilli extremely scanty in caseous contents."

Silcock† exhibited to the Pathological Society, London, the uterus, tubes, and ovaries of a child five years

* *Medico-Chir. Trans.*, vol. lxviii. p. 87.
† *Trans. Path. Soc., London*, vol. xxxvi. p. 303.

of age. The child died with symptoms of tubercular meningitis and otorrhœa. At the *post mortem* examination the tympanum was filled with caseous material; miliary tubercles were scattered through the pia mater of the brain and spinal cord, and similar tubercles occurred in the lungs.

The Fallopian tubes were enormously distended with caseous material, their walls being much thinned. The distension was greatest at the fimbriated end. Both tubes were surrounded by old adhesions. The cavity of the uterus was distended with caseous material. The peritoneum exhibited traces of peritonitis, which had subsided some little time previously. Small black nodules the size of millet-seeds, or smaller, were attached to the peritoneal surface of the intestines.

Tubercle bacilli were found in the recent tubercular foci of the lung, but they were not demonstrable in the caseous contents of the body of the uterus and Fallopian tubes.

This is a valuable case, as it demonstrates admirably the nature of the evidence on which it is reasonable to come to a conclusion that the lesions in the uterus and tubes were of tubercular origin. I remember examining the uterus and tubes in this case with very great care at the time the specimen was shown to the Society, as it was the first unequivocal case of tubercular salpingitis that had come under my notice.

Percy Kidd* briefly described the uterus and Fallopian tubes from a girl fourteen years of age, who died of pulmonary phthisis and disseminated tuberculosis. The cavity of the uterus was distended with yellowish gelatinous fluid, in which were abundant caseous masses. The left Fallopian tube was much thickened, and its

* *Trans. Path. Soc., London*, vol. xxxvii. p. 357.

walls contained caseous nodules and patches. Caseous fragments from the uterine wall contained tubercle bacilli "scattered about in very small groups."

Ballantyne and Williams* have recorded a case which occurred in an unmarried woman twenty-eight years of age, who was admitted into the Edinburgh Infirmary with symptoms of tubercular meningitis. Menstruation had begun at seventeen years of age, was irregular, and had been in abeyance during the six years preceding her fatal illness. At the *post mortem* examination tubercular disease of the brain, uterus, and Fallopian tubes was revealed. The lungs and peritoneum were healthy. Tubercle bacilli were detected in the lesions.

Tubercular salpingitis has wider *age limits* than any other inflammatory affection of the tubes. Undoubted cases have been recorded as early as the fifth year, and it has been recorded on good evidence at the age of forty. The greater number of cases occur between the fourteenth and twenty-fifth years.

The naked-eye characters of the Fallopian tube when affected with tuberculosis are often very characteristic, but sometimes it is impossible to distinguish between tubercular tubes and an ordinary specimen of pyosalpinx.

In many instances the abdominal ostium is occluded, and the lumen of the tube is stuffed tightly with caseous material. The tube is irregularly distended and contorted. On turning out the caseous substance the mucous membrane offers the usual velvety appearance so frequently presented by the walls of a chronic abscess cavity. In other specimens the tubercle is deposited in the walls of the tubes.

There is reason to believe that tuberculosis of the

* *British Med. Journal*, Jan. 24th, 1891.

tubes may be primary, but this is very difficult to demonstrate, because it rapidly extends to and involves the uterine mucous membrane. When the abdominal end remains open, the tubercular matter leaks into the general peritoneal cavity and sets up tubercular peritonitis.

In examining a body with disseminated tubercle and caseous matter in the Fallopian tubes it is difficult to decide whether the peritoneum is infected as part of a general infection or from the escape of morbid material from the tubes. This much, however, is certain: that we do sometimes meet with tubercular salpingitis with completely occluded ostium and no infection of the peritoneum, but it is unusual to find tubercular peritonitis and no tubercle in the tube.

Indeed, the facts obtained from the study of the morbid anatomy of this disease indicate very clearly that tubercular salpingitis, whether primary or secondary, is very prone to spread to and infect the peritoneum; this extension is due to the escape of the morbid material through the abdominal ostium before it becomes completely occluded. This circumstance may help to explain the apparent rarity of primary tuberculosis of the tube. Even when the abdominal ostium is occluded the peritoneum may be infected by perforation of the tube. Dr. Wheaton* has described a good instance of this. The patient, aged eighteen, single, had a swelling in the right iliac region, which was opened, and from which pus continued to be discharged until her death, three months later, from exhaustion. At the *post mortem* examination the abscess was found to be connected with localised suppurative peritonitis, due to the perforation of a Fallopian tube by tubercular ulceration. Tubercle bacilli were demonstrated in the lesions.

* *Trans. Obstet. Soc., London*, vol. xxxiii. p. 29.

The microscopical characters of tubercular salpingitis consist of inflammatory thickening of the serous covering and muscular coat of the tube. The enlargement of the muscular coat is often erroneously referred to as hypertrophy; it is due to small round-celled infiltration. Here and there small nodules are seen surrounded by muscle tissue; such nodules present the characteristic histological structure of tubercle, and in favourable sections suitably prepared tubercle bacilli may be detected. In most specimens the tubal mucous membrane is destroyed either by being infiltrated with inflammatory products or by ulceration.

Tuberculosis of the ovary occurs in two forms: either as small miliary nodules limited to its capsule, or as caseous masses in its substance.

The first variety is the commoner, and in probably all cases occurs as part of a general tuberculosis. In the majority of instances it is associated with tubercle of the peritoneum, but may occur independently of peritoneal infection.

So far as can at present be judged from the records of specimens furnished by competent observers, the caseous nodules in the ovary usually form part of a general infection, and at present there is no trustworthy evidence that the ovary is affected primarily with tuberculosis. In many of the specimens of ovarian tuberculosis of both forms the Fallopian tubes were affected.

An ovarian abscess unassociated with salpingitis is, in nearly all cases, tubercular (Fig. 89).

Records of ovarian tuberculosis require careful and critical consideration before acceptance.

Cystic ovaries in which the albuminous contents have been precipitated by immersion in alcohol have been recorded as examples of tuberculosis.

An admirable account of some specimens of ovarian tuberculosis, with numerous references, has been published by Dr. Griffith.*

A tubercular abscess of the ovary sometimes causes death by bursting into the peritoneal cavity.

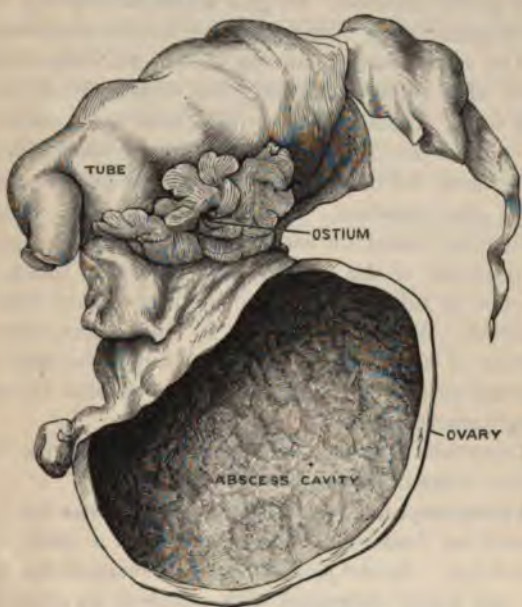

Fig. 89.—Tubercular Abscess of the Ovary.
The mesosalpinx is infiltrated, but the ostium is not occluded.

Diagnosis.—Little has been done in the direction of formulating rules to assist in the clinical recognition of tubercular disease of the ovaries and tubes. Yet a perusal of careful records of cases indicates several facts which seem common to many of them.

* *Trans. Path. Soc., London*, vol. xl. p. 212.

In the common forms of salpingitis, the patients, whether single or married, not infrequently furnish a history of gonorrhœa or septic endometritis, but the majority of reported cases of tubercular salpingitis have occurred in young women whose life in this respect is often above suspicion. In girls about puberty any form of salpingitis, other than tubercular, is very exceptional.

The signs most commonly present when this disease occurs after puberty are irregular menstruation, or, in many cases, persistent amenorrhœa, sometimes associated with profuse leucorrhœa in young women whose life and environment are of such character as to put gonorrhœa out of the question. If, in such a patient, irregular swellings are found on each side of the uterus occupying the positions of the ovaries and Fallopian tubes, the existence of tubercular disease of these organs may be suspected. When, in addition to such signs, there is evidence of tubercular lesions in the lungs, the suspicion as to the nature of the pelvic lesions should be more strongly entertained.

Tubercular abscesses of the ovary sometimes form fistulous communication with the rectum.

Actinomycosis of the Fallopian tube has been recorded by Zemann.* The patient was a cook, forty years of age. At the *post mortem* examination the right tube was found distended with purulent material, and actinomycotic nodules were detected in the walls. The tube was enlarged to the thickness of a finger; its walls were hard, and adherent to the surrounding parts and to a coil of the ileum.

Secondary abscesses existed in the liver, lungs, and brain.

* "Ueber Aktinomykose des Bauchfelles," Case iv.; *Medizinische Jahrbücher*, Wien, 1883, p. 477.

Zemann discusses the case very carefully; and it seems difficult to decide whether the tube became secondarily affected from the alimentary canal by means of the adherent loop of ileum, or was the primary seat of the disease, the actinomyces gaining access to the tube by way of the vagina. The evidence indicates that the vagina was most probably the channel by which the tube became affected.

Syphilitic gummata have been reported as affecting the tube. Bouchard and Lépine* reported a case in which the tubes were swollen to the dimensions of a finger, and contained three gummata the size of nuts.

* *Gaz. Méd. de Paris*, 1866, No. 41; Boldt, *New York Med. Record*, 1887, vol. xxxii. p. 212.

CHAPTER XXIV.

NEOPLASMS OF THE FALLOPIAN TUBE.

NEOPLASMS of the Fallopian tube are excessively rare. They are *adenoma*, *myoma*, and *cancer*.

Adenoma.—When describing the structure of the tubal mucous membrane, the question of the glandular nature of its recesses was fully discussed. If the Fallopian tube contains no glands, it is impossible that it can give rise to a primary adenoma; on the other hand, if the mucous membrane be glandular the occasional occurrence of an adenoma is not only possible, but probable.

It is quite certain that adenomata of an interesting and characteristic type occur primarily in the tube.

In 1879 Doran* exhibited to the Pathological Society, London, a Fallopian tube removed by Sir Spencer Wells from a maiden lady fifty years of age. On laying open the tube it was found filled with a cauliflower-like excrescence, covered with mucoid fluid which issued from the unclosed abdominal ostium. The general appearance of the tumour is well represented in Fig. 90. The excrescences grew from all parts of the mucous membrane in the dilated portion of the tube. Several pedunculated cysts, with thin walls, rise from amidst the excrescences, and contain papillary outgrowths. The free surfaces of the outgrowths are covered with columnar epithelium; some of the cells bear cilia. The stroma is made up of

* *Trans. Path. Soc., London*, vol. xxxi. p. 174.

small fusiform connective tissue cells and is poorly supplied with blood-vessels. The microscopical and naked-eye characters of the growth induced Doran to describe it as a papilloma.

Whilst engaged in working out the morphology of the tubal mucous membrane, I took the opportunity of re-examining and figuring the microscopical characters of this rare specimen, and had no difficulty in coming to

Fig. 90.—Adenoma of the Fallopian Tube. (After Doran.) (Museum, Royal College of Surgeons.)

the conclusion that it is an adenoma developed on the type of the glands found in the Fallopian tube. This relationship is well brought out when Fig. 91 is compared with Fig. 67, showing the mucous membrane in the tube of the Macaque monkey.

Dr. W. Walter, of Manchester, was good enough to place in my hands for examination an even more convincing specimen of Fallopian adenoma than the one just considered.

The specimen consisted of a large oöphoritic cyst, with a distended Fallopian tube. On examining the tube its abdominal ostium was found largely dilated, and

Fig. 91.—Microscopical Characters of a Fallopian Adenoma. (*Trans. Obstet. Soc.*)

On laying open the Fallopian tube the vesicles were found to involve the outer third of the tube and to spring from the mucous membrane. At first it seemed as though

one had to deal with a specimen of hydatid mole in the Fallopian tube.

Sections prepared from the base and solid parts of the tube, when examined under the microscope, exhibited the structural characters of an adenoma. The solid portion of the tumour was composed of delicate connective tissue, in which were embedded glandular acini, lined

Fig. 92.—Adenoma of the Fallopian Tube. (Dr. Walter's case.)

with a single layer of regular columnar epithelium. In some parts of the tumour, especially near the surface, cystic spaces containing sprouting masses of intra-cystic growth were found. The specimen differed from Doran's case in that it contained a far larger proportion of stroma.

An interesting feature in the clinical history of these cases is the presence of fluid in the peritoneum—hydroperitoneum. In the case described by Doran the fluid in the abdomen was removed by paracentesis on four occasions between March, 1878, and the removal of the

tumour in April, 1879, on which occasion seventeen pints of fluid were evacuated. In addition, the patient suffered from fluid effusions in the right pleura, for which she was twice tapped. After the removal of the right tube, with the tumour contained within it, the effusions ceased, and the patient was in good health in 1886.

In Dr. Walter's patient a quantity of fluid was present in the peritoneal cavity at the time of the operation.

The relation of hydro-peritoneum to these adenomata associated with patency of the tubal ostium has been made the subject of careful and suggestive study by Doran, to which reference has already been made, and, as he states:—"The ostium of the tube remained patent, and hydro-peritoneum persisted until the diseased tube was removed. The evidence that the secretion escaped from the ostium was positive."

An additional case has recently been published by Dr. Doleris,* which occurred in a woman twenty-eight years of age. Both ovaries and tubes were removed. The right tube formed a cyst of the size of a small nutmeg; masses of papillomatous growths sprang from the inner wall of the tube. The uterine end of the canal was very narrow; there was no fluid in the peritoneum. A peculiar clinical feature in this case was the discharge of large quantities of sero-sanguineous fluid from the vagina. An attempt had been made to cure this by curetting the interior of the uterus. The effect of this operation was to produce right-sided parametritis. The discharges after the operation became continuous, and [illegible] pale yellow, and of a syrupy consistence, which [illegible] linen like starch.

This is an extremely interesting clinical observation,

* [illegible] de la Soc. Obst. et Gyn. Paris, Jan. 1890.

and should be studied in conjunction with Skene Keith's remarkable case, referred to on page 258.

The cyst connected with the right Fallopian tube, in the case described by Doleris, is of interest in connection with a patient under my care. In this instance I removed from a very stupid Welshwoman, aged thirty-nine years, the ovaries and tubes. She had been under the care of several medical men for severe pelvic pain

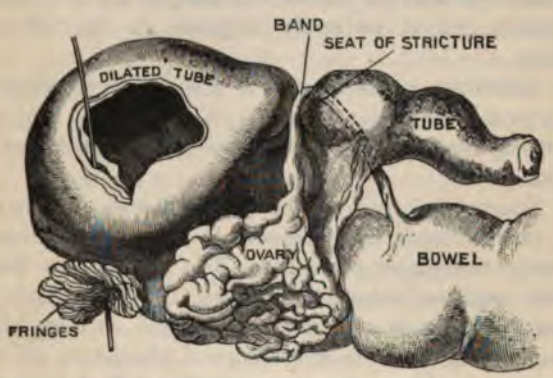

Fig. 93.—Fallopian Tube strangulated by an adhesion between the Ovary and Intestine.
The wall of the tube contains a cyst the size of a walnut.

and profuse menorrhagia. A tender and painful swelling of some size existed on each side of the uterus.

The left tube was strangulated by a stout adhesion connected to the ovary and a piece of intestine, as shown in Fig. 93. In the wall of the tube there was a cyst, the size of a walnut, filled with yellow pultaceous material. The lumen of the tube at the seat of the obstruction was completely occluded. The ostium was open.

The right tube was enlarged to the size of a finger; the ostium was open, the walls greatly thickened, and its interior stuffed with adenomatous masses in structure

resembling those found in Doran's specimen (Fig. 90). There was no hydro-peritoneum or watery discharges from the vagina.

There is good reason to believe that adenomata of the Fallopian are not infrequent. Such large specimens as those described by Doran and Dr. Walter are doubtless uncommon.

Myoma.—Considering the frequency of myomata in connection with the uterus, it is inexplicable that similar tumours should so rarely originate in the Fallopian tubes.

Reference is often made to a specimen recorded by Simpson,* but the account of it is so poor, and the drawing intended to represent it so crude, that it is of no value.

Spaeth† has reported the clinical history of a myoma of the Fallopian tube removed by Prochownick from a woman thirty-nine years old. The tumour was somewhat oval in shape, $5\frac{1}{2}$ by $4\frac{1}{2}$ cm., and had an average thickness of 4 cm. There was no trace of inflammation, and the microscopical characters of the mass suggested a general hypertrophy of the connective and muscle tissues of the tube.

A thorough search through special periodical literature of the past ten years leads me to emphasise Virchow's statement that myomata originating in the muscular tissue of the Fallopian tube are very rare, and are almost always so small as not to merit special mention.

I have satisfied myself that when there is general myomatous enlargement of the uterus, the muscle tissue of the tubes also participates in the change, becoming thick and hard. In some of these tubes the mucous

* *Clinical Lectures on the Diseases of Women*, p. 540.

† "Ein Fall. von Fibroid der Eileiters;" *Zeitsch. für Geb. und Gyn.*, Bd. xxi. s. 363.

membrane is very thin, and the lumen of the tube reduced to almost capillary fineness.

Cancer.—The fact that the Fallopian tube may be the seat of an adenoma leads us to expect that it would occasionally be affected with primary cancer. The small amount of trustworthy evidence forthcoming on this subject is sufficient to assure us that this dread disease is of extreme rarity in the tubes.

It is as yet impossible to write a general account of the affection, either from a pathological or clinical standpoint, but there can be little doubt that the widespread interest now manifested in the diseases of the Fallopian tubes will soon lead to the accumulation of evidence, of a trustworthy character, which will enable us to come to some conclusion as to its existence, probable frequency, and clinical characters.

In the meantime, as an example of the method in which such cases should be investigated, critically analysed, and duly recorded, I would refer to Doran's* admirable monograph on *Primary Cancer of the Fallopian Tube*, and also to the sequel of the case published subsequently. It contains a very accurate record of a remarkable case. The histology of the parts is illustrated by some careful drawings, and the paper contains references and criticisms of a few allied cases reported by Continental authors.

Secondary cancer of the tube has never been recorded, but cancer of the body of the uterus extends along the mucous membrane, and invades the tubes. This I have seen on a few occasions.

It has been observed by several who have had opportunities of conducting *post mortem* examinations in advanced cases of uterine cancer that it is unusual to

* *Trans. Path. Soc., London*, vol. xxxix. p. 208; and vol. xl. p. 221.

find the tubes invaded when the cancer originates in the cervix; but it is common to find the tubes in the condition of hydro- or pyo-salpinx under such conditions. When the disease extends upwards into the cavity of the uterus, it will occasionally involve the tubal mucous membrane, but extension of uterine cancer in this direction is the exception rather than the rule.

CHAPTER XXV.

THE DIAGNOSIS OF SALPINGITIS.

THE leading signs of *acute salpingitis* are not dependent upon the tube itself, but become most strikingly declared when the disease involves the peritoneum in the immediate vicinity of the ostium of the tube.

In acute *gonorrhœal* salpingitis the patient complains of a vaginal discharge, for which she may be already under treatment, and adds that she has been suddenly attacked by severe pain in one or both flanks. On examining the abdomen it will be found that even light pressure evokes pain, and on vaginal examination the ovaries will be found swollen and tender. With rest and appropriate treatment these symptoms subside or become chronic, but in a certain proportion of cases the local tenderness and pain extend over the belly, accompanied by distension, high temperature, vomiting, and the usual signs of general peritonitis, which sometimes kills the patient. Similar conditions occur in connection with acute salpingitis, secondary to *septic endometritis*, following abortion, delivery, and irritation caused by intra-uterine injections and instrumentation of the uterus. The discharges from the uterus may be at first clean, then they become foul, and the patient's temperature slowly rises to 100° Fahr. Suddenly the patient is seized with a rigor, the temperature rises to 103° or 104°, the belly swells and becomes tender, there are vomiting and all the signs of **general infective peritonitis.** This may kill the patient in a few days, and the

practitioner classifies the disease under the vague and meaningless phrase, **puerperal fever.** The sudden accession of pain and fever indicates the extension of inflammation from the mucous membrane of the tube to the peritoneum, but more frequently infection of the great serous cavity by the escape of putrid material through the as yet unclosed ostium of the tube. As a rule, *slow accession* of symptoms indicates gradual extension from mucous and muscular to serous tissue. *Sudden* onset of the ominous signs usually means actual leakage from the tube into the peritoneal cavity. This may be interpreted clinically: *slow extension leads to chronic changes; leakage, as a rule, leads to general peritoneal infection, and, not infrequently, death.* In some cases acute infection of the peritoneum is indicated by severe collapse. Cases of this nature are rarely seen by the surgeon. In 1890 I communicated to the Obstetrical Society a description of a case instructive in the direction of showing the suddenness with which the symptoms indicative of infection of the peritoneum are announced.

A woman forty-three years of age came under my care for the removal of a large gangrenous myoma, which had become in part extruded through the os uteri into the vagina; a portion of it projected beyond the genital orifice. The putrid mass was removed by means of an écraseur, and the uterine cavity freely irrigated with sublimate solution (1 in 2,000); the mucous membrane was ascertained to be gangrenous. For a few days after the operation the patient promised to do well; there was no pain or tenderness; the temperature rose to 101° in the evening, but in the morning fell to 99°. This rise was due to the condition of the uterus. On the evening of the third day after the operation the patient complained of sudden acute abdominal pain, followed by symptoms of shock, and she seemed about to die: the temperature

fell from 101° to 97° Fahr. In twelve hours the collapse passed off, severe peritonitis followed, and the patient died two days later. At the *post mortem* examination septic fluid and sloughs of the tubal mucous membrane were found projecting from the unclosed ostia of the tubes. The parts are represented in Fig. 70.

The connection between salpingitis and puerperal peritonitis has been pointed out by many writers. In 1862 Dr. Robert Barnes* placed on record "a case of peritonitis caused by the escape of pus, or putrilage, from the Fallopian tube into the abdominal cavity, following an abortion artificially induced." The patient was thirty-four years of age, and she died six days after delivery, from peritonitis. A *post mortem* examination was made on a coroner's warrant. Pus was detected in the uterus and Fallopian tube. In the left tube "pus was distinctly traceable into the peritoneal cavity."

Dr. Barnes in reporting this case refers to several writers who have observed and recorded instances of a similar mode of infection.

One of the cases is briefly but graphically described. It is related by Vocke :—"On the ninth day after labour a young woman—her progress to that time appearing satisfactory—was suddenly seized with acute pain in the seat of the left ovary, and died in forty-six hours. In the abdomen were found several quarts of sero-purulent exudation. The peritonitic signs were all most intense around the opening of the left tube. This tube gave forth little streams of pus when it was squeezed towards its end."

Other observers who have made similar observations mentioned by Dr. Barnes are Ed. Martin, of Berlin, Förster, and Dr. F. Howitz. Martin reports that "when

* *Trans. Obstet. Soc., London*, vol. iii. p. 419.

the escape of pus takes place sudden acute pain follows, then fever. The quick-ensuing tympanitis may obscure the signs of peritonitis."

Delbet* mentions that Siredey, in a thesis published in Paris, 1860, states that in twenty-nine autopsies made upon women who had died from puerperal affections he found in twenty-two the tubes dilated, full of pus, and the ovaries purulent.

In Great Britain very little attention has been devoted to this subject. The most significant observation on this matter is that made by Chapman Grigg,† to the effect that in five patients who died at Queen Charlotte's Lying-in Hospital with symptoms of *puerperal fever*, out of a total of 548 deliveries, extending over a period of nine months, four were due to antecedent disease of the ovaries or tubes. The conditions found in each case, *post mortem*, were :—

1. Multilocular cyst of right ovary, containing pus.
2. Abscess of left ovary and pyosalpinx.
3. Ovarian cyst (ruptured) and old pelvic cellulitis.
4. Chronic inflammation of the broad ligament and Fallopian tubes, causing pressure on the ureters (eclampsia).

In the four cases the patients were young women, their ages being twenty-one, twenty-two, twenty-three, and nineteen years respectively. Such a record is very significant, and needs no comment.

Chronic salpingitis is a very common disease, and one that not infrequently imperils life; even in cases where life is not endangered the pain and inconvenience the patients suffer are often such as to render their existence miserable.

* *Des Suppurations Pelviennes chez la Femme;* Paris, 1891.

† *Journal of the British Gynæcological Society*, vol. ii. p. 264.

Unfortunately, the effects of chronic salpingitis are imitated by several morbid conditions, so that positive diagnosis is very difficult. A careful inquiry into the history of the case will bring to light the fact that the patient has had gonorrhœa, but much more frequently we shall obtain evidence that some years previously the patient had a difficult labour, or an abortion complicated with septic troubles, and since then has remained sterile. She will further add that after the illness her menstrual periods began to be profuse, and of longer duration. In some, menstruation is too frequent. In most, defæcation is painful, and sexual congress so attended with pain that they avoid it. In a certain proportion of cases there is a purulent vaginal discharge.

It has been stated by one or two writers that instead of menorrhagia there is *amenorrhœa*. My experience is that amenorrhœa accompanying other signs of salpingitis usually indicates that the tubal mischief is *tubercular*.

On examining the abdomen, an irregular tender swelling may be sometimes detected in one or both flanks; more frequently there is an indefinite swelling, and in some, on palpation, a sense of resistance can be made out, but in very many cases no swelling can be detected by palpation of the abdomen.

On internal examination there will be found lying on each side of, or behind, the uterus an elongated swelling, which usually gives rise to great pain when pressed by the examining finger. Not infrequently the uterus is acutely retroflexed, and then the uterine fundus, with the enlarged tubes and ovaries, forms a rounded ridge running transversely across the pelvic floor.

As a rule, a moderately distended tube can only be felt through the vagina, or by the bi-manual method of examination: that is, when the index finger is in the vagina, and the opposite hand pressed upon the

abdominal wall, the fingers of each hand will compress between them the enlarged body, be it tube or ovary.

Frequently an enlarged or distended tube is more readily felt through the rectum than through the vagina. As collections of fæces in the rectum may not only lead to false notions as to the existence of an inflamed tube, but render difficult, as well as disagreeable, a proper rectal examination, it is always advisable to take precautions to have the rectum thoroughly emptied by means of an enema some hours before the examination.

Many conditions simulate disease of the Fallopian tubes.

Small tumours of the ovary.—When speaking of cystic disease of the ovary we are so apt to associate the condition, especially when discussing the question from the surgical side, with large tumours rising above the pelvic brim, that it is often forgotten that small cysts of the ovary not infrequently produce more discomfort and actual pain than larger tumours of this organ. The ovary, like the testis, is acutely sensitive to pressure, and when it is slightly enlarged and increased in weight it drags upon the broad ligament, so that instead of hanging *suspended* in the pelvis it *lies* on the floor of the recto-vaginal fossa. The ovary under such conditions is apt to give rise to pain during defæcation, especially if it is the left one that is affected. In these cases pain during sexual congress is a prominent symptom, and frequently the one for which the patient most urgently seeks relief. On examining the patient a rounded movable body about the size of a walnut is felt behind the uterus; when pressed by the examining finger, pain is evoked. When the ovary is movable it can rarely be mistaken for a distended tube, but when bound down by

adhesions such ovaries are frequently diagnosed as distended tubes.

Another mode in which small cysts cause pain is when they become impacted in the pelvis. Such a specimen is shown in Fig. 13. This ovary was removed by Mr. H. W. Freeman from a young married lady, who complained of almost constant pelvic pain and leucorrhœal discharge. On examining her through the vagina, an indistinct swelling could be made out on the left side of the uterus. The elongated rounded border presented by the cyst when impacted between the uterus and pelvic brim caused it to resemble a distended tube. This view of the case was further suggested by the existence of a profuse vaginal discharge and intensification of pain at the menstrual periods. The evening preceding the operation the patient complained of intense pain in the pelvis, and began to menstruate. As the ovary was drawn up through the wound, a follicle which could only have been ruptured a few hours was detected on the surface.

The ovarian cysts that cause most pain are small dermoids, equal to, or scarcely larger than, a Tangerine orange. These become firmly fixed by adhesions to the peritoneum in the recto-vaginal fossa, and cause intense suffering. They are usually diagnosed as distended tubes.

It is very difficult, and often impossible, to differentiate before operation between a small cyst impacted in the pelvis and a distended tube, because the compression alters the shape of the cyst. For instance, the parovarian cyst sketched in Fig. 43 was so wedged in between the uterus and the pelvis that it resembled the tubular sausage-like feel of a moderately distended Fallopian tube; pressure by the examining finger caused intense pain. So tightly was the cyst impacted that it

required some force to dislodge it. There were no adhesions and no signs of inflammation; it was therefore reasonable to attribute the pain to pressure resulting from impaction.

This specimen may with advantage be compared with the cyst sketched in Fig. 41. Such cysts cause much pain; they are freely movable, and are usually mistaken for enlarged ovaries. Patients with cysts of this nature describe the pain as of a dragging character, probably due to the *tension* the cysts exert upon the tubes, for in all the specimens I have examined in which the cyst was situated in this peculiar relation to the tubo-ovarian ligament the tubes were greatly elongated. It is possible that the strain exerted upon the tubo-ovarian ligament produces painful sensations.

Other conditions of the ovary likely to lead to error in the differential diagnosis of ovarian enlargement and tubal distension are hæmorrhages into its follicles, or into the stroma—the so-called "apoplexy of the ovary"—and ovarian growths, such as myoma or sarcoma, in their early stages.

The clinical signs of ovarian disease are very similar to those of testicular disease, in so far as pain is concerned. Hæmorrhage into the substance of the testis, or inflammation, causes intense pain; whilst a large hydrocele produces no pain, and a sarcoma, in most cases, gives rise to a feeling of discomfort, due to the tension it exerts upon the spermatic cord.

In a general way it may be stated that it is impossible to accurately diagnose between the various forms of tubal distension and the following forms of ovarian disease:—

1. Tubercular abscess of ovary.
2. Apoplexy of the ovary.
3. Small oöphoritic or paroöphoritic cysts.

4. Small parovarian cysts.
5. Solid ovarian tumours in their early stages.
6. Small ovarian dermoids.
7. Early tubal pregnancy.

A few suggestions relative to the diagnosis of *tubercular salpingitis* and *oöphoritis* are given at the end of chapter xxiii.

Retroflexion of the uterus has been mistaken for tubal disease. I have known the abdomen to be opened for the purpose of removing tubes supposed to be diseased when only a retroflexed fundus was found. It seems difficult to understand how such an error could arise. It is quite as serious to commit the converse error, and mistake an inflamed or distended tube for a simple flexion of the uterus, and proceed to treat the case with a pessary, or attempt to straighten it with a uterine sound. I remember well seeing an enterprising obstetric physician introduce a sound to "straighten a retroflexed uterus" in a woman twenty-four years of age. The manœuvre caused great pain and shock. In a few hours general peritonitis ensued, and death occurred two days afterwards. At the *post mortem* examination a ruptured pyosalpinx was found. It has been already mentioned that a flexed uterus is sometimes associated with enlarged and adherent tubes.

It is in such cases that the so-called minor gynæcological operations are often productive of mischievous, and even fatal, results.

To dilate and curette the interior of the uterus in a woman whose tubes are distended with pus will, in many instances, endanger life.

Bladder troubles in connection with pelvic tumours and inflammatory swellings occasionally arise. Apart from the diseases of the bladder itself, interference with micturition may occur in *pelvic cellulitis* (especially when

it affects the tissues anterior to the uterus), *impacted uterine myomata*, *impacted ovarian dermoids*, in retroversion of the *gravid uterus*, and in anterior *serous perimetritis*.

Retroversion of the gravid uterus means that the body of the uterus is lodged in the hollow of the sacrum, and is prevented from rising on account of the promontory of the sacrum. As the uterus enlarges the cervix is raised, compresses the urethra, and causes retention, often accompanied by incontinence (*ischuria paradoxica*). The clinical signs of a gravid uterus in this condition are very decided. First, there is the presence of an oval hypogastric tumour, the *over-full* bladder, a history of pregnancy between the third and fourth month; and on examination, a rounded elastic swelling (the body of the uterus occupying the hollow of the sacrum) will be felt, whilst the cervix lies behind the pubes, and sometimes so high that the finger can scarcely reach it. On passing a catheter and emptying the bladder the hypogastric tumour will disappear. On examining the abdomen bimanually the uterus will not be found in the abdomen. These facts serve to distinguish an incarcerated uterus from uterine myomata, tubal pregnancy, or ovarian tumour, for in all these conditions, when the cervix lies behind the symphysis, the fundus of the uterus can be felt through the anterior abdominal wall. The diagnosis is usually verified by rectifying the position of the uterus. After emptying the bladder, upward pressure on the uterus through the vagina will cause it to ascend. Sometimes it will be necessary to administer an anæsthetic. Hurry* has published a valuable series of cases illustrating the signs of retroversion of the gravid uterus. Dr. Godson† communicated an interesting paper to the

* *St. Barth. Hosp. Reports*, vol. xix. p. 297.
† *Proc. Med. Soc., London*, vol. vii. p. 385.

Medical Society, London, 1884, giving a brief account of the early literature of this condition.

Tactile judgment is a very important factor in the diagnosis of pelvic swellings. To estimate the size, consistence, mobility, or fixity, etc., of a tumour lying in close relation with the uterus requires experience. At consultations the most varied opinions are expressed: a pelvic swelling, which one will estimate as equal in size to a walnut, to another feels as large as an egg. This difference in the delicacy of touch often leads to erroneous opinions at consultations, and is productive of much misunderstanding.

In a general way it may be stated that *when a Fallopian tube is so distended as to render it capable of being felt above the pelvic brim, it is liable to be, and often is, mistaken for an ovarian cyst.*

On the other hand, when ovarian and parovarian cysts are not large enough to be felt above the pelvic brim, they are usually diagnosed as pelvic cellulitis, or distended tubes.

In addition to the ovarian conditions mentioned on page 296 with which tubal disease is frequently confounded, and from which it is scarcely possible to distinguish them clinically, the following list indicates other sources of error:—

8. Retroflexion of the uterus.
9. Pelvic cellulitis (parametritis).
10. Fæcal accumulation in the rectum.
11. Kidney in the hollow of the sacrum.
12. Small uterine myoma.
13. Cancer of the sigmoid flexure.
14. Abscess due to inflammation of the vermiform appendix.
15. Tumours of the sacrum or innominate bone.
16. Tumours of the broad ligament, including hydatid cysts.

In a few cases laparotomy has been performed, and nothing found.

Pelvic pain.—The most misleading symptom of all is *pain*, especially when most pronounced at the menstrual period. Such pain has been described as ovarian neuralgia, and has induced surgeons in some instances to remove the ovaries, even in the absence of physical signs. On two occasions such ovaries have been submitted to me for microscopical examination, but I have not succeeded in detecting any evidence of disease in them.

This is consonant with what we find in other organs. Young women often suffer from pain, sometimes of severe character, in the breast, but the most careful examination fails to reveal any lesion which explains the painful sensation. In the same way, highly sensitive nervous men complain of pain in the testicles.

On one occasion I obtained the advice of Sir James Paget concerning a young lady who experienced severe pain in the left breast, for which no reasonable cause could be assigned. This acute observer stated he had frequently noticed that in young women interested in the study of the *fine arts*, sensations, which in others cause little or no concern, sometimes are frequently in them the source of inconvenience and much suffering.

On looking over the clinical notes of my cases I find a great deal of evidence that supports this highly important observation.

It must be observed that the removal of painful organs in such cases does not destroy the pain. It may relieve for a time, but sooner or later pain returns with its former intensity, resembling in this respect inveterate trigeminal neuralgia.

CHAPTER XXVI.

THE TREATMENT OF SALPINGITIS AND OÖPHORITIS.

THE *treatment* of salpingitis, whether secondary to septic changes originating in the uterus or in the vagina, is much the same.

Acute salpingitis ensuing upon *labour* or *abortion* is usually described as *puerperal fever*. The principles of treatment are very simple: they are absolute and prolonged rest in bed, extreme cleanliness, and attention to the bowels are the most important.

In **gonorrhœal salpingitis,** during the acute stages, absolute rest in bed should be enjoined, and mild vaginal injections ought to be freely employed. It must be remembered in treating these cases that the pelvic pain of which the patients complain indicates that the inflammation has extended from the tubes to the peritoneum, and that, in addition to salpingitis, there is inflammation localised to the pelvic peritoneum.

In the early stages, especially when the symptoms supervene upon abortion, it is difficult to accurately discriminate between salpingitis and cellulitis of the broad ligament; this is an additional reason for enjoining absolute rest in order to prevent the formation of a pelvic abscess.

The treatment of the early stages of salpingitis is very simple, yet it is not too much to state that if more attention were directed to this disease at its commencement, many women would be saved much subsequent misery and pain.

When the mucous membrane of the tubes has become seriously damaged, the tube itself fixed by adhesions to surrounding structures, the ovary involved in the inflammation, and the lumen of the tube occluded, then drugs are of little avail.

When the patients are in good circumstances, and able to lead an idle life, they often become chronic invalids. It is such patients who are able to indulge in the luxury of visits to Continental health resorts to try the effects of various springs and baths, and the mud or moor-baths of Bohemia.

In women who have to perform household duties, and even get their own living, a life of luxury and ease is out of the question. Under such conditions it is necessary to adopt more radical measures.

The ordinary rules of surgery suggest that when the physical signs and history of the case indicate that the tubes are occluded and distended with pus or other fluid, producing so much pain and inconvenience as to cause the patient to lead the life of a chronic invalid, then it is justifiable to remove them by abdominal section. To dilate and scrape the interior of the uterus in such cases, to tap them through the vagina, or attempt to disperse them by electricity, by moor-baths, or by mild purgatives, are modes of treatment which can only be described as ridiculous, and in many cases they are highly dangerous. It must be confessed that the whole difficulty in the treatment of these cases lies in the diagnosis. If the surgeon could be sure his patient were suffering from a collection of pus in the tubes, he would have no more hesitation in removing them than he feels in recommending the excision of a sacculated and suppurating kidney.

It is to be hoped that now so much close attention is being devoted to these diseases, we shall be able to

formulate some more certain signs of the presence of pus in the tubes, which will enable us to advocate the necessary lines of treatment with more confidence.

Removal of the Fallopian tubes and ovaries is necessary in the following conditions :—

1. Pyosalpinx and tubo-ovarian abscess.
2. Hydrosalpinx.
3. Tubercular salpingitis.
4. Ovarian abscess.

In these affections the operation is not only justifiable, but it is the only means of radical treatment. It is sanctioned and practised by those who have had the greatest experience in ovariotomy, and an examination of their lists of recorded cases shows that, under the impression they were dealing with ovarian or parovarian cysts, they have removed Fallopian tubes, sometimes filled with pus, sometimes with less harmful fluid.

In *tubercular* salpingitis the operation should only be undertaken when there is no evidence of tubercle in other organs, such as the lungs, bladder, kidneys, or peritoneum.

The records of operations for this form of tubal disease show that they are attended with a very high rate of mortality, and convalescence is, as a rule, prolonged.

The conservative measure advocated under the term of *salpingostomy* is as yet in its infancy.

Hernia of the ovary.—Herniated ovaries require removal when they are a source of pain, and in women who cannot wear a truss. The operation has been almost entirely confined to those who have to maintain themselves by hard work; a very large proportion of the patients are domestic servants. The operation is performed as for inguinal hernia ; the ligatured stump should be returned into the peritoneal cavity.

THE OPERATIVE TREATMENT OF NEUROTIC CONDITIONS ASSOCIATED WITH THE OVARIES.

The removal of the ovaries and tubes has been recommended and practised for the relief of such conditions as :—

1. Epilepsy and insanity.
2. Dysmenorrhœa.
3. Ovarian neuralgia.
4. Prolapsed ovary.

In this group the procedure has not been followed by encouraging results ; indeed, they are so unsatisfactory that those who have had greatest experience in this class of surgery are almost unanimous in condemning the operation, save under very exceptional conditions ; even then the operator should safeguard himself by seeking confirmatory opinion.

It would be tedious and useless to enter into a full discussion of the reasons that have been urged against the routine employment of so severe an operation for the relief of these *neurotic affections*. The chief objections are summarised in the following clauses :—

1. In a very large proportion of cases the removal of the ovaries and tubes fails to relieve the patient.
2. In many cases the operation aggravates the symptoms.
3. In only a very small proportion of cases has there been *permanent* improvement.
4. Many cases reported a few weeks or months after the operation as *cured* have subsequently relapsed.

The objections may be briefly expressed in this way : *The inherent risks of the operation and the uncertainty of the result.*

It has been pertinently suggested that *if the positive benefits of the operation were as assured as its rate of recovery, the opposition to it would soon cease.* In answer to this, it should be remembered that we are not in possession of trustworthy statistics on which to base an even approximate rate of mortality.

The arguments adverse to removal of the ovaries simply because they are believed to be a source of mental alienation or neuralgia, in the absence of physical signs indicating disease of these organs, are many. Those interested in the subject will find them ably set forth in articles by Sir Spencer Wells* and Dr. Playfair.†

The *mortality* of *oöphorectomy* as compared with ovariotomy is distinctly higher. All experienced ovariotomists are unanimous on this point.

It is a significant fact that many surgeons who have published long lists of ovariotomies in order to parade their manipulative skill have abstained from publishing in the same way records of their oöphorectomies. Tait,‡ Keith,§ Meredith,‖ and a few others, have published lists of this operation, but we have little collective evidence of its risks in the hands of the average surgeon.

In many instances where oöphorectomy has been carried out for the relief of pain, unaccompanied by objective signs in the pelvic viscera, the operators have pointed out, in justification of the interference, that the ovaries were cystic. There is a subtlety in this excuse. The so-called practical surgeon, as a rule, affects to scoff at pathology. Such men, I find, apply the term *ovarian*

* *International Journal of the Medical Sciences*, vol. xcii. p. 455.
† *Trans. Obstet. Soc.*, vol. xxxiii. p. 7.
‡ *Diseases of the Ovaries;* 1883.
§ *Edin. Med. Journal*, 1887, p. 811.
‖ *Med.-Chir. Trans.*, vol. lxxii. p. 53.

to cysts of the size of a Tangerine orange and upwards. When they excise an ovary for pain they cut into the organ, and finding ripe follicles, describe it as a cystic ovary. Every normal ovary is cystic, hence an excuse is readily found. The ovary represented in Fig. 2 is a perfectly normal gland; it is cystic, but the cysts are mature follicles. Many such have been removed under the impression that the presence of such cysts justified removal. The ovaries are in many respects analogous to the breasts. A healthy woman may have small breasts, and another her equal in age and size perhaps possesses a pair of large plump mammæ, yet both glands fulfil their function. The same is equally true of the ovaries. That shown in Fig. 2 was as healthy and capable as the large gland in Fig. 1.

In an organ liable to vary so much, and naturally concerned in forming cysts, it is not surprising that healthy ovaries should be frequently mistaken by the inexperienced for diseased organs.

Part III.

TUBAL PREGNANCY.

CHAPTER XXVII.

TUBAL PREGNANCY.

In every female mammal above Monotremata there is a section of the genital tract intervening between each abdominal ostium and the uterus in which, under normal conditions, impregnated ova are not retained. These narrow portions are the Fallopian tubes, and they serve to conduct the eggs from the ovaries to the uterus. It is usually taught that in the human female the tubes are the meeting place of ova and spermatozoa, but this is pure conjecture. The opinion that the spermatozoa pass up the tube and disport themselves among the fringes at the abdominal orifice is unsupported by facts; so is the fable that the Fallopian tubes are able to grasp the ovary and secure the ovum at its dehiscence.

Hyrtl, in his classical *Lehrbuch der Anatomie*, writes:—"The fimbriæ at the abdominal ostium appear as if they were bitten or torn away; hence the term *morsus diaboli*. The devil has since Eve's time had more to do with womenkind than with men." Der Schwabenspiegel (1273) says: "*Mulier est malleus, per quem diabolus mollit et malleat universum mundum.*" The term *morsus diaboli* is borrowed from botany. The plant *Scabiosa succisa*, formerly much used owing to its healing properties, was called "devil's-bit scaby," because its root presents a premorse, or bitten-off, appearance. The

virtues of this plant to suffering humanity rendered it an object of dislike to the devil, and the superstitious old herbalists believed that in his wrath he bit off the root. There is, however, little resemblance between the *root* of the plant and the fringed ostium of the Fallopian tube, but Doran has pointed out the striking resemblance which exists between it and the *flower* of the devil's-bit scaby.

It is more reasonable to believe that impregnation occurs normally in the uterus, and that when fecundation occurs in the tubes it is accidental, and tubal gestation is the consequence.

Concerning the cause of tubal pregnancy we know little.

In many instances it happens in women who have been married eight, ten, and even twenty years, and have never before been pregnant, yet the first pregnancy occurs in the tube. In one of my cases the patient had been twice married, and had lived in wedlock seventeen years, and then became the victim of tubal gestation, never having been pregnant before. In other cases it follows a normal pregnancy or abortion by one, two, three, or four months. It may occur as a first pregnancy in a woman between thirty and forty years of age or in a girl of twenty; in the newly-married or the mother of a large family. Parry* has shown it occurs most frequently after long intervals of sterility, and it may occur twice in the same patient, as Dr. Herman† has indisputably demonstrated.

The fact that pregnancy occurs in the tube after a long period of sterility in women who have borne children has given colour to the suggestion that the

* *Extra-Uterine Pregnancy.*
† *Brit. Med. Journal*, vol. ii. p. 722; 1890.

patients have suffered from desquamative salpingitis, and the destruction of the proper ciliated epithelium will account for occurrence of tubal gestation, inasmuch as it puts the mucous lining of the tubes into a condition exactly similar to that of the uterus after menstruation. Mr. Lawson Tait asserts that "the uterus alone is the seat of normal conception; that as soon as the ovum is affected by the spermatozoa it adheres to the mucous surface of the uterus; that the function of the ciliated lining of the Fallopian tubes is to prevent spermatozoa entering them, and to facilitate the progress of the ovum into the proper nest; further, that the plications and crypts of the mucous membrane lodge and retain the ovum either till it is impregnated, or till it dies or is discharged." *

The above view is entirely a speculation, and, as far as I am aware, no one has attempted to substantiate or disprove the causative relation between desquamative salpingitis and tubal gestation. I have made it the subject of prolonged investigation, and am prepared to state that it contains an element of truth, but it does not hold in all cases. In the first place, salpingitis so severe as to produce destruction of the tubal epithelium causes such profound changes in the tubes themselves as to lead to stricture and complete occlusion of the abdominal ostia; it is exceedingly rare to meet with tubes denuded of their epithelium and the abdominal ostia patent. It is, however, well to bear in mind that salpingitis, even of a mild type, may so affect the tubal mucous membrane as to retard or altogether prevent the passage of ova, and an examination of pregnant tubes shows that salpingitis of a mild type, and without even partial destruction of the epithelium, will lead to the

* *Ectopic Pregnancy*, p. 4.

detention of ova and expose them to spermatozoa, which may wander into the tubes. On the other hand, in several specimens of very early tubal pregnancy I have failed, even after the most careful microscopic examination, to find any evidence of old salpingitis or loss of epithelium. The museum of St. Mary's Hospital contains an interesting specimen in this relation. A single woman aged twenty years was suddenly seized with severe abdominal pain, followed by symptoms indicative of internal hæmorrhage. Rupture of a pregnant tube was suggested as the cause, but disregarded, as the hymen was intact. Death occurred three days after rupture. At the necropsy a ruptured sac was found in the left Fallopian tube. In company with the curator, Mr. J. J. Clarke, I examined the sac, and found it to contain chorionic villi. Sections were prepared from the tube, but the epithelium was intact, and no evidence of salpingitis was detected.

Early in 1890 I saw in consultation with Dr. Owen Coker a young married woman who presented the signs of rupture of a gravid tube. The diagnosis was confirmed, for on opening the abdomen I removed from a large rupture in the left tube an apoplectic ovum the size of a bantam's egg. The right tube and ovary were bound down by dense adhesions. The patient died on the third day after operation, from peritonitis; this was due to leakage of pus from the right tube, which was converted into a pyosalpinx; the mucous membrane presented all the characters of an old-standing salpingitis.

Unfortunately, few operators take the trouble to examine the tubes in such cases. Dr. Griffith * reported a case of tubal pregnancy which terminated fatally at

* *Path. Trans.*, vol. xxxiii. p. 227.

an early date. Both tubes, though apparently healthy to the naked eye, were found on microscopic examination to exhibit marked evidence of disease. The mucous membrane was quite denuded of epithelium, and "the conditions present appeared to indicate a comparative recovery from a destructive inflammation of the mucous membrane." The woman had been married eleven years, but had never before been pregnant.

An impregnated ovum may lodge in any part of the tube; as the course of events varies according to its position, it will be necessary to consider separately the changes that ensue when the ovum is arrested in the tube proper, or in that section which traverses the walls of the uterus. Gestation in the tube proper will be called *tubal pregnancy;* in the uterine segment, *tubo-uterine pregnancy.* The last variety will be considered in a separate chapter.

The changes which follow the arrest of an impregnated ovum in the tube will be considered under the following heads :—

1. The changes in the tube and the mode of closure of the abdominal ostium.
2. Pathological changes affecting the ovum.
3. Tubal abortion.
4. Rupture of the gestation sac.
5. The formation of, and the pathological changes in, the placenta.

The changes in the tube.—During the first month or six weeks that portion of the tube in which the ovum is lodged becomes very vascular and much thickened. This has been described as hypertrophy, but it differs greatly from the enlargement exhibited by a gravid uterus. The latter is due to an increase in size and number of the muscle cells, whereas in a gravid tube the increase in

size is mainly due to turgescence. This statement is the outcome of the microscopic examination of eight specimens of gravid tubes between the fourth and twelfth weeks of gestation. Herman* is of opinion that the tubes hypertrophy, but not to the same extent as the uterus. In some the walls of the tube in contact with the ovum seem to stretch and thin from the beginning of the gestation. The rapidity of the thinning varies in different tubes, and this is doubtless due to the fact that under normal conditions the Fallopian tubes not only vary in length, but in thickness. In some individuals they scarcely exceed in thickness the vasa deferentia of the male, or resemble the narrow tubes of the mare or cow. As the tube expands from the enlargement of the ovum within it, the mucous membrane is stretched and its glandular folds effaced. Occasionally a few of the plicæ will project within the tube as long straggling processes.

Whilst these changes are in progress, curious alterations are taking place at the abdominal ostium, which, in most cases, gradually bring about its occlusion, an event usually completed by the eighth week. During the first four weeks the congestion of the parts causes turgescence of the fimbriæ as well as of the muscular and serous tissues adjacent to them. When the parts are thus swollen, the margin of peritoneum adjacent to the ostium is very conspicuous, and forms an irregular ring over the fimbriæ. In another fourteen days this ring projects beyond the fimbriæ, and, lastly, contracts and hermetically closes the ostium. Two stages in this process are represented in Figs. 94 and 95.

Occasionally specimens will be found at the tenth or twelfth week, and even later, in which the ostium is only

* Fowler's *Dictionary of Medicine*; article, "Extra-Uterine Gestation."

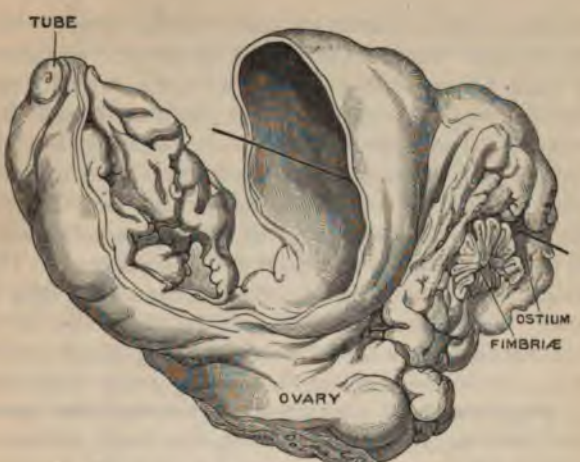

Fig. 94.—Gravid Fallopian Tube at the sixth week.
The walls are extremely thin; its ostium is partially closed.

Fig. 95.—Gravid Fallopian Tube at the tenth week, showing complete occlusion of the Ostium.
O, Ovary with corpus luteum.

partially closed. I have recorded * such a case in which the clinical history and the size of the embryo showed that the pregnancy had advanced to the twelfth week. The history of the case also indicated that the tube had ruptured about the sixth week of gestation, and the embryo dislocated between the layers of the mesometrium. This view is supported by the fact that the degree of closure manifested by the ostium corresponds to that seen in tubes examined at the sixth week. This should be borne in mind, or such cases may lead to error. To prevent which, it may be stated that *if the tube rupture before the ostium is completely closed, and the patient survive the accident, the occluding process is arrested.*

Pathological changes in connection with the ovum.—After impregnation, the most important change which occurs in connection with the investing membranes is the growth of cellular dendritic processes, known as chorionic villi. When thoroughly developed, the villi cause the exterior of the ovum to present a shaggy appearance, and serve to fix it to the adjacent mucous membrane, whether uterine or tubal; they soon become permeated by vessels conveyed to them from the aorta of the embryo by the allantois. Subsequently the greater number of the villi atrophy; those which persist increase greatly in size and complexity, and ultimately form the fœtal portion of the placenta. It matters not whether the gestation be tubal or uterine, the life of an ovum is precarious until the placenta is well formed, for the union between the ovum and the mucous membrane is not very intimate when it depends on the chorionic villi in their early stages. The result is that from a variety of causes the ovum may be dislodged in part, or entirely, from its relation to the mucous membrane; such dislodgement is always

* *Trans. Obstet. Soc., London*, vol. xxxiii. p. 70.

accompanied with, and in very many instances actually caused by, hæmorrhage among the chorionic villi. Practitioners are familiar with rounded bodies discharged from the uteri of pregnant women, accompanied by profuse hæmorrhage. These bodies are known by various names, "blighted ovum," "fleshy or carneous mole," "apoplectic ovum," etc. They are so common that most pathological museums usually contain several specimens, and few matrons terminate their reproductive period of life without producing one or more examples of the fleshy mole. The clinical expression for the event is abortion. When an apoplectic ovum is examined soon after its discharge, it resembles a firm blood-clot in colour and consistence. On dividing it, a cavity containing fluid, sometimes straw-coloured, sometimes stained red from admixture with blood, is found. The walls of this cavity are smooth and lined with amnion, and often a misshapen fœtus is contained within, or the stump of the umbilical cord; frequently no trace of an embryo can be detected. A fleshy mole is really an early ovum with its membranes, into which blood has been extravasated. The extent of the extravasation varies; occasionally the blood invades the amniotic cavity and overwhelms the embryo. Fleshy moles similar to those arising in the uterus occur in connection with tubal gestation, and they appear to be more common between the fourth and eighth weeks than at any other period. Their formation is, in most cases, attended with disastrous consequences to the individual unfortunate enough to become the victim of tubal pregnancy. This fact alone should cause them to be carefully studied.

In October, 1889, I communicated to the Royal Medico-Chirurgical Society* two cases of fleshy moles

* "A Case of Tubal Pregnancy:" *Medico-Chirurgical Transactions*, vol. lxxiii. p. 55. Keller has since described three and Orthmann ten cases (*Zeitschrift für Geburtshülfe*, 1890).

from the Fallopian tubes, which I had removed from patients, and showed that they in no way differed from apoplectic ova so frequently discharged from the uterus. Since then I have had opportunities of dissecting and examining several specimens. It is of some importance to be familiar with their chief features, because the existence of a fleshy mole is certain proof of pregnancy. When the extravasation of blood is extensive and obliterates the amniotic cavity, it causes doubt whether we are dealing with a lump of blood coagulum or an apoplectic ovum; for it must be borne in mind that an ovum of this character detained for many days in the pelvis after its discharge from the tube, or if it be lodged between the layers of the broad ligament for many weeks, becomes laminated and hard. Under such conditions its nature can only be satisfactorily determined by finding an embryo or its remains imprisoned in the clot, or by ascertaining the existence of chorionic villi. On several occasions I have been able to demonstrate the existence of tubal pregnancy by the presence of villi alone. In size, tubal moles vary greatly, depending, of course, on the date at which the hæmorrhage happens. My smallest specimen equals in size the kernel of a cob-nut; the largest is as big as a Tangerine orange. The size of an apoplectic ovum depends on the date at which the hæmorrhage occurs, as well as on the amount of blood extravasated into the membranes. In an interesting specimen which Dr. Herman removed before rupture, he found, on slitting open the sac, that "hæmorrhage had taken place into the chorion, and the coagulated blood made the interior of the sac precisely resemble the interior of the apoplectic ova so numerous in our museums." In this valuable specimen the blood was extravasated into the membranes of the ovum only; there was no free blood in the tube. That an apoplectic

ovum is not formed merely by the *immersion* of its membranes in blood is demonstrated by cases in which, after rupture of a tubal gestation sac from violence, the ovum has remained for several hours soaking in blood, yet when removed from the body its membranes and villi have been found delicate and transparent. The same condition occurs in early ova discharged from the uterus. It would appear that the formation of a mole in the tube is a frequent means of inducing tubal abortion or rupture. The museum of St. Bartholomew's Hospital contains a specimen which illustrates this. It is described thus, under the heading "Hæmatoma of the Broad Ligament":—"The uterus and its appendages: between the layers of the right broad ligament is a globular cyst about as big as a walnut, the wall of which, in the recent state, was seen to be formed by the separated layers of the ligament; its cavity was filled with recent blood coagula. On the anterior aspect of the cyst were two small, recently formed, irregular openings. From a patient twenty-five years of age, who, while in the hospital for treatment of warts on the vulva, was suddenly attacked with the symptoms of internal hæmorrhage, and died in twelve hours. At the *post mortem* examination the cavity of the peritoneum contained five pints of recently effused, loosely coagulated blood; and dark fluid blood oozed slowly from the openings in the cyst above described. A very careful examination of the blood cyst failed to discover the source of the hæmorrhage. There was no evidence of the existence of uterine pregnancy, and no ruptured vessel was detected. It was uncertain whether the patient was menstruating at the date of the attack" (2940).

Thanks to the courtesy of the present curator, Mr. Edgar Willett, an opportunity has been afforded me of

examining and sketching this interesting specimen. On opening the parts it was clear that the blood-clot was not between the layers of the broad ligament, but was entirely

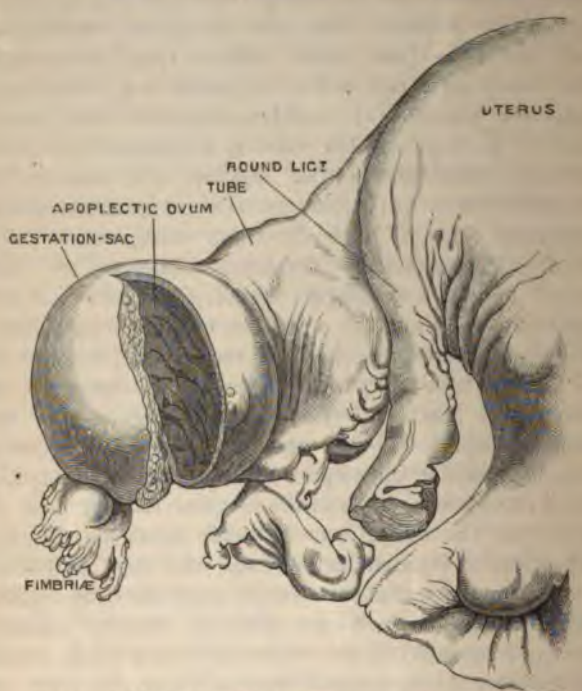

Fig. 96.—Left Fallopian Tube and adjacent portion of the Uterus. (Museum, St. Bartholomew's Hospital.)
The tube is occupied by an apoplectic ovum or mole.

within the tube; its histology showed clearly enough the supposed blood-clot to be really an apoplectic ovum, and that the woman was the victim of a tubal pregnancy, which proved fatal about the fourth or fifth week (Fig. 96).

Many similar specimens are displayed in the museums attached to metropolitan hospitals, and described under a variety of names, but their ovuline nature has been completely overlooked.

It will be useful to briefly summarise the characters by which a mole found in a Fallopian tube, loose in the pelvis, or between the layers of the broad ligament, may be identified.

(*a*) When recent, it resembles, in external appearance, a piece of blood coagulum of a dark red colour. If it has

Fig. 97.—Apoplectic Ovum, or Tubal Mole. Natural size.

been free in the peritoneal cavity or lodged between the layers of the broad ligament for several days or weeks, it will be of a yellowish colour externally (due to a layer of fibrin), and quite firm and hard.

(*b*) Large tubal moles are often elliptical in shape (Fig. 97). Small ones are more or less circular.

(*c*) The average size of moles is that of a walnut. They rarely exceed in size a Tangerine orange. When smaller than a cob-nut they are usually lost in the clot.

(*d*) The presence of a central cavity lined with a smooth membrane—the amnion. The cavity may contain an embryo; very frequently the cavity is destroyed early, or the mole may be ruptured and allow it to escape with the blood-clot.

(*e*) Sections of the clot will show under the microscope chorionic villi. The most trustworthy sign of all is the presence of an embryo. Next in value is the existence of chorionic villi, and these may be detected in moles even when blood has broken into and obliterated the amniotic cavity.

Chorionic villi, when seen in sections of an apoplectic ovum, are very easily recognised. Usually they appear as clusters of circular bodies; ten or more may, in fortunate sections, be counted together; more frequently they occur in groups of three or four, and often a wide section of clot may be examined without finding more than two or three. Under a low power they present an external layer of epithelial-like cells, the central space being occupied by irregular-shaped cells (Fig. 98). When examined under high powers, the limiting layer is often formed of a perfectly regular row of cubical epithelium. Sometimes the interior of a villus resembles the stratum intermedium of an enamel organ. In larger villi a double row of epithelium may be detected.

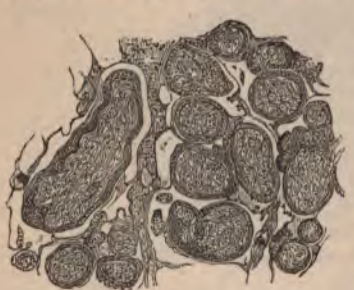

Fig. 98.—Microscopical Appearances of Chorionic Villi in transverse section. Low magnification.

That these oval and circular organised clots found in Fallopian tubes are impregnated ova is amply proved by the fact that occasionally they contain embryos. In Herman's specimen, referred to on page 367, the mass in the tube was a typical example of an apoplectic ovum, and the amniotic cavity was occupied by an embryo.

Plate V.—A Tubal Mole in section, under low magnification. The natural size of the mole is shown in Fig. 99.

Here and there, chorionic villi are seen in section.

CHAPTER XXVIII.

PRIMARY RUPTURE OF THE GESTATION SAC.

That the majority of pregnant Fallopian tubes rupture is undeniable. The exceptions are those cases in which the ovum is discharged through the abdominal ostium (tubal abortion), or the exceedingly rare instances in which the ovum, becoming apoplectic at a very early date, remains quiescent in the tube.

Rupture of the tube will be discussed in sections indicated in the subjoined table:—

I. Primary Rupture.
   (*a*) *Intra-peritoneal.*
   (*b*) *Extra-peritoneal.*

II. Secondary Rupture.
   (*a*) *Intra-peritoneal.*
   (*b*) *Extra-peritoneal.*

Primary rupture.—This term refers to the rupture of the tube which, in the majority of cases, occurs at some period between the third and tenth week after impregnation, and is rarely deferred beyond the twelfth week.

The predisposing causes of rupture are the gradual thinning of the walls of the gestation sac as the embryo grows, and the sudden enlargement of the ovum by hæmorrhage into its villi. Rupture is sometimes induced by violence.

Before considering this event in detail, we may for a moment study the relation of the Fallopian tube to the broad ligament. The healthy tubes in the human female occupy the free borders of this structure, and are on

two-thirds of their circumference invested by it; indeed, the tube is held in position by a peritoneal investment resembling the mesentery. The portion of the broad ligament adjacent to the tube is appropriately termed the mesosalpinx.

When the tube becomes enlarged in consequence of inflammation, or dilated by an embryo growing within its lumen, the layers of the mesosalpinx become separated by the enlarging tube.

This separation of the layers of the mesosalpinx, however, does not occur along the whole extent of the tube, but is restricted mainly to its middle third. It is important to realise this, because it explains the frequency of *intra-peritoneal* rupture when the ovum is situated in the *outer third* of the tube. The anatomical evidence alone leads us to expect that when a pregnant tube ruptures the chances of this accident involving the serous covering would be greatly in excess of rupture through the uncovered portion, and as a matter of fact intra-peritoneal is to extra-peritoneal rupture in the proportion of three to one.

In **primary intra-peritoneal rupture,** the ovum, accompanied by a variable amount of blood, may be discharged directly into the peritoneal cavity. The quantity of blood extravasated depends upon the date of rupture. When it occurs early, the blood extravasated may amount to a few ounces, but after the first month it is usually very copious, and frequently causes death in a few hours. When rupture is deferred until the seventh week the ovum is not so constantly discharged through the rent, and as the walls of the gestation sac are prevented from contracting, the amount of blood which escapes is often very large.

When the hæmorrhage is moderate in amount and the patient escapes the immediate dangers incidental to

the accident, especially shock, the effused blood may undergo partial absorption, and recovery ensue. Authentic instances of this are uncommon, but satisfactory evidence in support of this will be adduced in the following chapters. When the amount of blood poured out is large—forty or more ounces—there is a certain amount of risk of peritonitis. It is, however, well established that this complication rarely causes death after primary rupture.

It has been urged that primary intra-peritoneal rupture is almost uniformly fatal unless art intervenes, but this requires qualification. When the hæmorrhage is not excessive, the blood collects in the recto-vaginal pouch and floats up the coils of intestines, and these, with the omentum, gradually form a covering to the fossa by adhering together, thus isolating the blood in the pelvis from the general peritoneal cavity. Unless hæmorrhage recurs the fluid portions of the blood are slowly absorbed, and the patient recovers, but convalescence is very tardy.

The dangers of primary intra-peritoneal rupture are :—

1. Rapid death from hæmorrhage.
2. A fatal result may ensue from repeated hæmorrhage.
3. Peritonitis. This is very rare.

Primary extra-peritoneal rupture.—In a fair proportion of cases the tube ruptures through that portion of its circumference lying between the separated layers of the mesosalpinx. When this happens the blood and ovum are forced into the connective tissue between the layers of the broad ligament. In most cases this is fortunate for the patient, as the bleeding becomes checked by the pressure exerted by the resistance which occurs when the mesometric tissue becomes distended, and is arrested before it assumes dangerous proportions. In such cases it is fortunate for the patient if the ovum has

been converted into a mole, for then the pregnancy is ended; the blood and ovum are sepulchred, as it were, in the mesometrium, and rarely cause subsequent trouble.

Rupture may take place, and the embryo remain uninjured and continue its development with advantage, for, no longer confined within the narrow limits of the tube, it begins to avail itself of the additional space thus offered, and burrows, as it grows, between the layers of the mesometrium.

According to the manner in which this mode of rupture is sometimes described, it might be imagined that the tube splits, and the products of gestation are suddenly discharged from the tube into the broad ligament. This is not the case, or the pregnancy would in every instance come to an end from the dissociation of the fœtal from the maternal structures. As far as I have been able to study the morbid anatomy of the accident, the slow and gradual distension of the tube causes it to thin and gradually yield in that part of its circumference uncovered by peritoneum until an opening forms, accompanied by sudden hæmorrhage, which produces collapse, the profundity and duration of which depend upon the amount of blood that escapes. This artificial opening gradually extends until the growing embryo and placenta make their way into and by degrees occupy the new area of connective tissue opened up, unless the life of the embryo is endangered by renewed hæmorrhage.

When pregnancy continues in this way it is spoken of as a "broad ligament gestation," because the sac is formed in part by the expanded Fallopian tube and the layers of peritoneum forming the broad ligament.

The development of a fœtus in this situation was first described by Dezeimeris,* in a very inaccessible

* *Journ. de Connaissance Méd. Chir.*, Jan., 18

publication, as the sous-péritoné-pelvienne variety of extra-uterine gestation. My knowledge of his views rests on the following statement from Parry's* book.

"By sub-peritoneo-pelvic (sous-péritoné-pelvienne) pregnancy Dezeimeris intended to designate a variety in which the ovum, after quitting the ovarian vesicle, did not enter the Fallopian tube nor fall into the peritoneal cavity, but, on the contrary, passed between the two folds of the broad ligament, and there developed. According to this view, the product of conception is situated outside of the cavity of the peritoneum. That the ovum has been found in this locality cannot be doubted, but when such is the case there is every reason to believe that it reaches this peculiar situation through rupture of a tubal cyst, in which the integrity of the peritoneum was not destroyed, so that the ovum escaped between the two layers of the broad ligament, where it continued to develop. It is therefore one of the terminations of an ordinary tubal gestation."

Subsequent observation on this head has not only justified Parry's opinion, but demonstrated the fact that in all tubal pregnancies which survive the primary rupture and continue their development, the gestation sac is formed in part by the expanded tube, but mainly by the layers of the corresponding broad ligament. The proper appreciation of this fact has done much to simplify our knowledge of tubal pregnancy; and no one has more strongly insisted upon its correctness than Lawson Tait.

* *Extra-Uterine Pregnancy*, p. 32.

CHAPTER XXIX.

TUBAL ABORTION.

It has already been pointed out that the presence of an impregnated ovum in the outer third of a Fallopian tube usually leads to occlusion of the abdominal ostium; this event is commonly complete by the end of the sixth week, sometimes it is delayed to the eighth week; it is therefore a comparatively slow process. It is important to bear this in mind, because it serves to explain an apparent discrepancy, to the effect that the abdominal orifice is sometimes open and sometimes closed. As a matter of fact, the condition of the ostium depends upon the date at which it is examined after the lodgment of the ovum. So long as this orifice remains open the ovum is in constant jeopardy of being extruded through it into the peritoneal cavity, especially when it lies in the ampulla of the tube, and the nearer it is situated to the ostium the greater is the chance of its being thus discharged from the tube. To this accident the term "tubal abortion"* may be applied, for it is exactly parallel to those early abortions occurring in connection with uterine gestation before the end of the second month; and it further resembles them in the fact that the ovum is apoplectic. These cases of "tubal abortion" are worthy of attention because specimens of Fallopian tubes have been frequently described in which blood-clot has been found hanging from their fringes, associated

* A term introduced by Keller. (*Zeitschrift für Geburtshülfe*, Bd. xix.; 1890.)

with localised dilatations of the tubes, resembling gestation sacs.

The term tubal abortion is applicable to cases in which hæmorrhage takes place from a gravid tube, the blood entering the peritoneum through an unclosed ostium, the tube remaining whole (Fig. 99).

Many of these cases resemble uterine abortions in which the ovum, from some cause or other, becomes apoplectic and is expelled, accompanied by a free discharge of blood from the uterus. When it occurs early the ovum is small, and, unless carefully sought for, frequently escapes detection; when large, it is easily recognised. In tubal abortion the same thing happens. The ovum is discharged with a copious hæmorrhage into the peritoneal cavity through the ostium, accompanied with the usual signs of internal bleeding, and death may occur early from the anæmia thus induced or from shock. Escaping this danger, the patient may fall a victim to peritonitis. In such instances the ovum, being very small, escapes recognition when the clot is examined, either at the operation or *post mortem*. Tubal abortion can only occur during the first two months, for when the ostium is occluded the blood cannot escape without rupture of the sac. The quantity of blood which flows from the tube into the peritoneal cavity sometimes amounts to thirty, or even fifty ounces. Tubal abortion is a subject of much interest, inasmuch as it furnishes many of the cases of pelvic hæmatocele which are ascribed to metrorrhagia, reflux of menstrual blood from the uterus, and hæmorrhage from the mucous membrane of the Fallopian tube. The reason for associating the hæmorrhage with metrorrhagia and menstruation is due to the fact that, whilst the ovum is growing in the tube a decidua is forming in the uterus. When tubal abortion occurs, hæmorrhage takes place from the uterus,

consequent on the separation and expulsion of the decidua. Should this accident happen near the time the patient expects to menstruate, the case would be regarded as reflux of menstrual fluid into the peritoneum. If it does not coincide with a menstrual period, it is then usually considered to be of uterine origin. It will therefore be well, in searching blood removed in abdominal operations, to examine carefully any apparently organised ovoid clot, in order to ascertain if it contain an amniotic cavity, with or without an embryo, and also ascertain the existence or otherwise of chorionic villi.

When the ovum is lodged in the uterus, and hæmorrhage indicative of abortion happens, it does not necessarily follow that the ovum is immediately discharged; in some instances it is retained many days by some portion of the chorion. This is equally true in tubal pregnancy. In a case of this nature, the details of which I communicated to the Obstetrical Society, London, 1890, a rounded body, the size of a cob-nut, was found within the tube, adherent by a narrow segment of its circumference. The tube was full of thick fluid blood, and a large quantity was found free in the peritoneal cavity; this blood had escaped from the tube, and entered the peritoneal cavity through the unclosed ostium. Some delicate processes projecting from the small body within the tube were examined, and found to be chorionic villi. The body and the mucous membrane to which it was attached were cut out, embedded, and sectioned for the microscope. It then became clear that it was a small tubal mole.

A careful drawing of its microscopical appearances is furnished in Plate V. The clinical evidence indicated that the ovum had been impregnated three or four weeks. This is the smallest tubal mole that has come under my notice.

Many of these cases are overlooked.

A glaring example of intellectual blindness in this direction is furnished by Goupil* in his interesting account of intra-pelvic hæmorrhages occurring in extra-

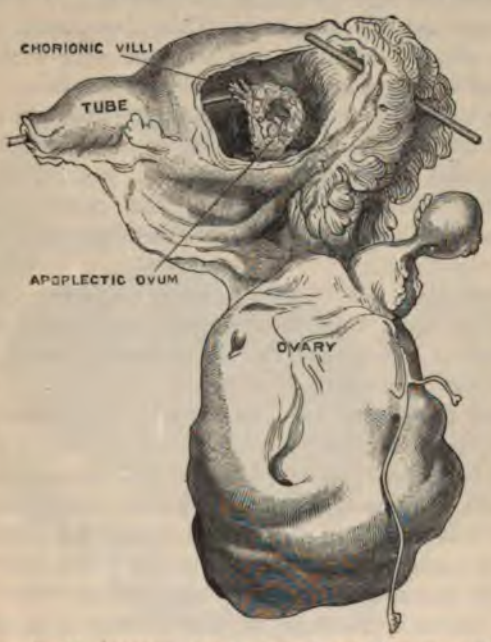

Fig. 99.—Gravid Fallopian Tube. Natural size. (From a patient the subject of tubal abortion.) (*Trans. Obstet. Soc.*)

uterine pregnancies. After arranging the various causes of this accident under five headings, he writes :—

"A sixth variety might have been made in which effusion of blood results from simple hæmorrhage of the Fallopian tube, but it would rest on only one observation

* Bernutz and Goupil: *Clinical Memoirs on the Diseases of Wome* p. 235; New Sydenham Society translation.

and that an imperfect one. The fœtus in that case was not found, and extra-uterine pregnancy was based only on the opinion of M. Robin that a certain membrane presented the appearances of the chorion. M. Fenerly has published the case in his *Thèse Inaugurale*, p. 46 (Paris, 1855). A patient was admitted with sub-acute peritonitis, which terminated fatally in ten days. The uterine walls were thicker than normal. The right Fallopian tube contained a clot as big as an egg, which was hollow and lined by a membrane, yielding microscopically the characteristics of the chorion. The uterine cavity was lined with a swollen vascular mucous membrane."

This case was clearly a typical example of an apoplectic ovum within the Fallopian tube, and is one of the earliest examples I can find recorded, but its true nature was overlooked.

Sometimes they are described by the meaningless term—hæmatosalpinx.

It is necessary to bear in mind that in early uterine abortion, with retention of an apoplectic ovum, bleeding is apt to recur as long as the ovum is retained; so in the case of a gravid tube, as long as the mole remains in the tube the hæmorrhage is almost sure to recur.

A correct appreciation of tubal abortion is important in relation to pelvic hæmatocele, and there can be little doubt when the condition is more widely known it will be possible to formulate rules which will enable a distinction to be made between it and primary rupture of a gravid tube.

Judging from descriptions of cases which have been recently published, tubal abortion is a frequent termination of tubal pregnancy; the occurrence of the accident is indicated when a pelvic hæmatocele forms gradually in the course of a few days. A knowledge of this fact will

do much to induce practitioners to improve very considerably their present unsatisfactory mode of treating these conditions. For a patient to be confined to bed for weeks or months, and afterwards to lead the life of a chronic invalid, is a reproach to our art, when by a prompt

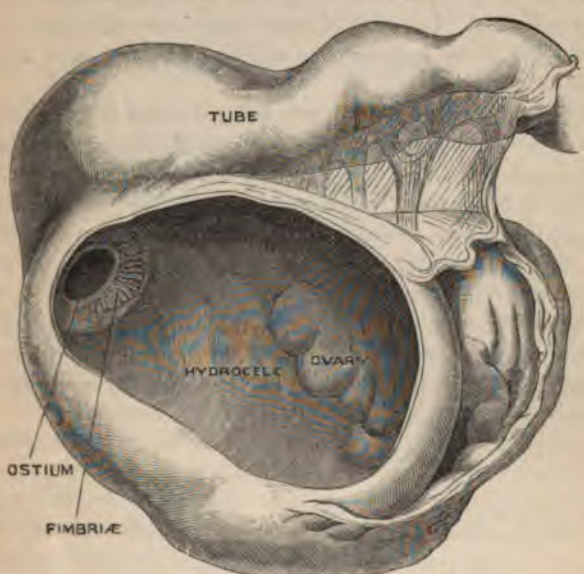

Fig. 100.—Ovarian Hydrocele.

operation the tube can be removed, hæmorrhage arrested, and a speedy convalescence ensured.

In tubal abortion the blood extravasated into the peritoneal cavity is rarely found clotted, and it is always venous in character. The venous condition is due to the fact that the oxygen rapidly escapes from the blood, and is absorbed by the surrounding tissues.

Tubal abortion and the ovarian sac.—The

anatomy of the ovarian sac has been already discussed; for a long time I made many systematic observations of the mammals in which this sac is well developed, with the notion that an impregnated ovum might be found in it, for, as far as my investigations have extended into the subject, I am convinced that *ovarian gestation* has no existence, but that it may have been mistaken for *gestation in an ovarian sac*, which, of course, is a very different matter.

When pregnancy occurs in a Fallopian tube the ostium of which opens directly into a complete ovarian sac, such as is shown in Fig. 100, it would result that if tubal abortion took place, the blood, instead of escaping into the pelvic cavity, would be retained in the sac surrounding the ovary, and form what would virtually be an *ovarian hæmatocele*. This would in many cases be a favourable termination, unless the hæmorrhage be so profuse as to rupture the sac. In the human subject such a combination of circumstances must be very rare.

CHAPTER XXX.

TUBAL GESTATION.

THE PLACENTA AND DECIDUA; SECONDARY RUPTURE.

THE placenta in tubal gestation presents many peculiarities in its mode of development, and is liable to so many vicissitudes which influence very materially the life of the child, as well as that of the mother, and in many cases is such a source of anxiety to the surgeon, that it is imperative upon those who may be called upon to deal clinically with tubal gestation to consider the subject with more than ordinary care.

It is also necessary to consider it before dealing with secondary rupture of the gestation sac.

The formation of the **placenta in tubal gestation** differs in several particulars from one developed in the uterus. In normal gestation the uterine mucous membrane takes a large and important share in forming the placenta, but, as far as I can judge from my own observations, the tubal mucous membrane plays a very insignificant part when pregnancy occurs in the tube.

The fully-developed uterine placenta is composed of parts derived from the maternal and fœtal tissues in nearly equal parts, whilst a tubal placenta is mainly, if not entirely, derived from the fœtal tissues.

Our scanty knowledge of the early stages of the tubal placenta is entirely owing to the difficulty of obtaining specimens, because in nearly all cases the tube has ruptured, and the structure of the parts is considerably damaged before they come into the hands of the histologist.

Taking the generally received account of the formation of the uterine placenta as a basis (and it should be remembered that even this is in a large measure a matter of inference), the tubal placenta develops in the following manner:—The ovum, soon after its arrest in the tube, becomes shaggy, from the growth of chorionic villi over its outer surface. These villi are at first tufts of cells which become vascularised by the entrance into them of vessels derived from the allantois. As the villi bud out from the chorion they insinuate themselves into the adjacent folds of tubal mucous membrane. As the ovum increases in size, and the tube slowly distends, the plicæ of the mucous membrane become narrowed, but the chorionic villi increase in length, thickness, and complexity until the tubal mucous membrane is reduced to extreme tenuity, and its processes running between the villi are reduced to thin streaks.

When clusters of chorionic villi are cut at right angles and examined under the microscope, they present an appearance identical with sections prepared in a similar manner from a uterine placenta about the sixth or seventh month of gestation.

A careful examination of several early examples of tubal gestation has served to convince me that the tubal mucous membrane takes no share in the formation of the placenta.

Thus the tube, when occupied by a developing ovum, conducts itself very differently to a gravid uterus. The walls of the uterus enlarge uniformly and the mucous membrane thickens. The tube, on the contrary, becomes gradually thinned and expanded. In some instances there may be a little thickening at the placental site.

Parry, in discussing this matter, writes:—"The muscular coat may be greatly thinned and atrophied, so that the retention of the ovum in its cavity is almost entirely

due to the support of the peritoneum. As a rule, however, the muscular layer of the tube is found hypertrophied. Under the influence of the stimulus imparted by the presence of a vitalised germ in the cavity of the organ, the muscular fibres undergo hypertrophy, much as those of the gravid uterus do after a normal conception. This process, however, is less rapid and energetic than it is in the organ which was specially intended for the reception and development of the product of conception. It cannot therefore keep pace with the increase in size of the ovum, in consequence of which the muscular coat may present the appearance of being thinned and atrophied, even though the whole amount of muscular tissue may be increased."

The decidua.—Concerning the decidua, Parry writes:—"The development of the decidua in extra-uterine pregnancies has given rise to much discussion. Even at the present time (1876) opinions are very varied in regard to it, some contending that it is formed in all cases, others that it lines the extra-uterine gravid cyst" (p. 68). He then gives references to those authorities who believed that the decidua always surrounds the ovum and those who are of opinion that it is always formed in the uterus. All recent writers who have studied the pathology of tubal pregnancy are unanimous that no decidua forms in the tube. The majority are of opinion that it forms in the uterus in all cases. My own observations are so thoroughly consonant with Parry's that his views will be given in his own words:—

1. In all varieties of extra-uterine pregnancy a decidua forms in the uterine cavity, as in normal gestation, but none surrounds the ovum.
2. The decidua is rarely retained until the completion of gestation, and thrown off during false labour. More frequently, if the patient goes to term, it is

discharged during the early periods of pregnancy in small fragments, and without producing pain; or else it is expelled *en masse* with symptoms of miscarriage.

3. The absence of a uterine decidua when death has occurred from rupture of the cyst, even in the early stages of pregnancy, is not proof that the membrane has not been formed, but simply that it has been expelled before the death of the fœtus.*

It is important not to confound the decidua of pregnancy with menstrual decidua occurring in what is called membranous dysmenorrhœa.

Menstrual decidua rarely exceed an inch or an inch and a quarter in length, and are scarcely a line in thickness. As a rule they are translucent, and rarely passed entire.

Decidua of pregnancy are larger, and vary in thickness from an eighth to a quarter of an inch. They may be described as bags resembling in outline an isosceles triangle. The base corresponds to the fundus of the uterus, and the apex to the internal os. At each angle of the triangle there is an opening. Those at the basal angles correspond to the Fallopian tubes, and the apical orifice to the cervical canal. The outer aspect is shaggy, and the inner surface is dotted with the orifices of uterine glands (Griffith).

Up to the period of primary rupture the formation of the placenta has been proceeding in relation with the mucous membrane of the Fallopian tube, but after this event, if the disturbance of the parts is not so great as to terminate the pregnancy, the course of events is modified in a remarkable manner. We are indebted largely to the

* *Extra-Uterine Pregnancy.*

admirable investigations of Drs. Berry Hart and Carter for the facts upon which this account is based. After primary rupture of the tube, the embryo and placenta (when the development is sufficiently advanced) gradually occupy a sac formed by the expanded tube and separated layers of the broad ligament, the floor of this space being formed by connective tissue and the levator ani muscle.

The ultimate effects of this gradual dislocation of the embryo and placenta depend mainly upon the original position of the placenta. Dr. Berry Hart points out that if the embryo lies above the placenta, the latter becomes depressed downwards between the layers of the mesometrium until it is arrested by the pelvic floor. If, on the contrary, the embryo lies below the placenta, the embryo in its membranes burrows between the layers of the mesometrium, and the placenta becomes pushed up by the growing embryo until it lies high in the abdomen. He has had opportunities of investigating the structure of these extra-uterine placentæ, and points out that in tubal gestation the villi lie embedded in decidual cells, and no intervillous sinus system seems to exist. Large sinuses, however, have formed in the muscular wall. The villi are well-formed, and are covered with perfect epithelium. The decidual cells are large, and have a large nucleus and nucleolus. When the placenta is displaced into the mesometric tissue—and we must bear in mind that this displacement occurs gradually—the placental structure becomes seriously damaged. The villi are less perfect in contour, blood extravasation is present, blood crystals are abundant, while the decidual cells are few and less perfect.

Dr. Berry Hart's observations lead him to conclude that the displacement of the placenta from mucous membrane to connective tissue gradually reduces the placenta to a mass of compressed villi, the serotina is destroyed

and replaced by blood crystals and organising blood-clot. The least damage is sustained by the placenta when the embryo is situated above it, because under such conditions it undergoes the minimum amount of displacement.

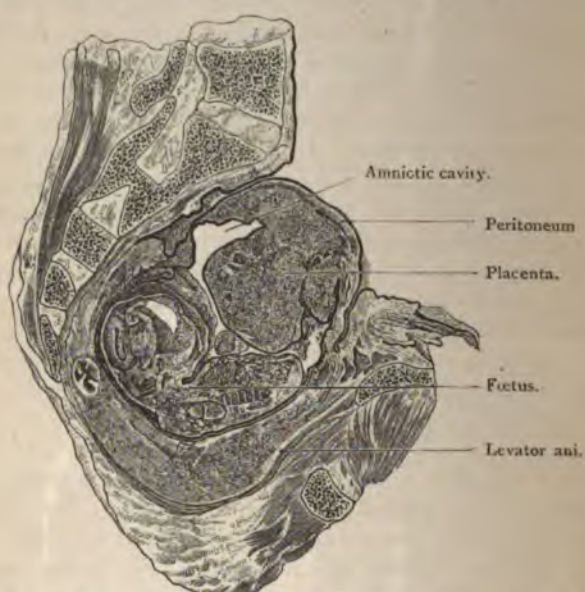

Fig. 101.—Transverse Section of the Pelvis of a Woman with an Embryo and Placenta of the fourth month of Gestation occupying the right Broad Ligament. (After Berry Hart.)

The extreme disorganisation to which the placenta is liable when it forms the roof of the gestation sac may be studied even in the early stage of the pregnancy. In 1891 I exhibited before the Obstetrical Society* a gestation sac which had ruptured at the sixth week into the mesometrium, and at the twelfth week burst into the

* *Trans. Obstet. Soc., London*, vol. xxxiii. p. 70.

general peritoneal cavity. A prompt operation saved the

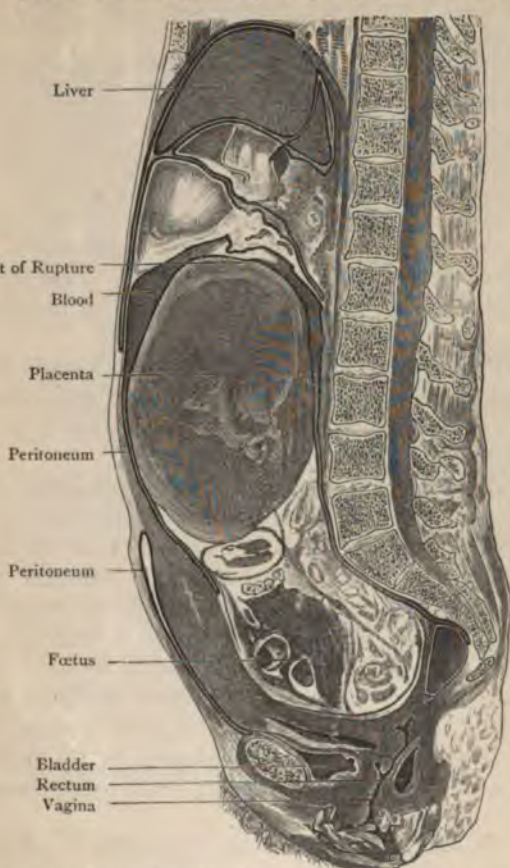

Fig. 102.—Sagittal Section of a Cadaver, with a Broad Ligament Pregnancy at term; it indicates the extreme displacement of the Placenta. (After Berry Hart.)

patient's life. The placenta was situated above the embryo, and repeated hæmorrhages into its substance had

converted it almost entirely into a disc of blood-clot, in which, on microscopic examination, a few groups of villi could be detected.

The amount of displacement to which the placenta is liable when the embryo lies below it is well shown in Fig. 102, which was made by Dr. Berry Hart from frozen sections which he prepared from a woman who died from secondary rupture of the gestation sac.

In the specimen from which Fig. 101 was obtained the pregnancy had advanced to the fourth month. The embryo lies between the layers of the broad ligament, whilst the placenta forms a kind of roof to the gestation sac.

The drawing, Fig. 102, represents the relation of parts when such a pregnancy goes to term. The placenta has been gradually elevated from the pelvis until it is raised far above the level of the umbilicus.*

It must be obvious that a placenta when displaced in this way must have its function very seriously hampered in comparison with one firmly deposited on the floor of the pelvis. It has been demonstrated histologically that there is great damage produced by this slow migration.

It is of the utmost importance to correctly appreciate the structural alterations which occur in the placenta consequent upon these remarkable displacements to which it is subject, as they exert a great influence on the subsequent history of the pregnancy, greatly imperilling the life of the mother, and being in most cases disastrous to the life of the fœtus.

The danger in which such displacements of the placenta place the mother is this:—The constant tension to which the peritoneum covering the gestation sac is

* These valuable observations were communicated to the Obstet. Society, Edin., 1887. The paper is published with admirable illustrations in the *Edin. Med. Journ.*, vol. xxxiii. p. 332.

subject may at any time cause it to yield, and lead to partial detachment of the placenta, and as a consequence severe hæmorrhage, which may take place into the gestation sac, or more probably into the peritoneal cavity. Such hæmorrhage in the late stages of these pregnancies is almost invariably fatal. Indeed, a woman with a broad ligament pregnancy, with the placenta situated above the fœtus, runs a far greater risk of losing her life than if she were the victim of the dreaded condition termed *placenta prævia*.

Apart from this great danger, the woman runs an indirect risk through the fœtus. The latter is dependent upon the placenta exactly as in uterine gestation. We have seen already that tubal placentæ are less perfect organs than uterine placentæ. Even when a tubal placenta lies below the embryo after rupture, its structure is sufficiently damaged to render it an inefficient respiratory organ; hence it must be much less adequate for the needs of the fœtus when it is situated above the embryo, and subject to the grievous vicissitudes which have been already discussed.

The results on the embryo are very manifest. A fœtus the product of a tubal gestation is a very unsatisfactory individual. Even when rescued by the surgeon at or near time, they rarely survive longer than a few days or weeks. In many cases they are ill-formed, and present hydrocephalus, club-foot, spina bifida, ectopia of the viscera, or similar deformity, and even when normal in shape are exceedingly defective in size.

In the majority of cases the fœtus dies. When this event occurs at the fourth or fifth month there is reason to believe that the placenta may in some instances continue to grow, instead of undergoing atrophy. At any rate, it is quite certain that now and then, in cases of tubal gestation, a shrivelled fœtus is found attached to a

placenta which is not only out of relative proportion to the fœtus, but absolutely larger than the placenta of a uterine fœtus at full term. The death of the fœtus may indirectly affect the mother. As long as the sac containing the dead fœtus remains air-tight, it is a safe place of sepulture, the fœtus becoming *desiccated* and thoroughly *mummified* in a fair proportion of cases; in others it undergoes partial conversion into *adipocere;* and in a few, lime-salts are deposited in the walls of the sac and superficial parts of the fœtus, and convert it into a *lithopædion*.

More frequently gases from adherent bowel find their way into the sac, decomposition ensues, and the gestation sac becomes converted into an abscess cavity.

Under such conditions the cutaneous walls of the sac may slough, and an attempt be made to discharge the fœtus and placenta, as in the case recorded by Sheild,* in which a young married woman had been for several weeks ill with fever, and complained for several months of an abdominal tumour. The uterus was explored, and found to be empty. When Mr. Sheild saw the patient she had a large circular orifice with sloughy margins in the situation of the umbilicus. Through this a black, pultaceous, offensive mass protruded. Chloroform was administered, and the protrusion was found to be the buttocks of an extra-uterine fœtus. The opening was enlarged and the fœtus extracted; the placenta was removed piecemeal. The gestation sac was completely isolated from the general peritoneal cavity. Cases in which the integuments slough so as to allow the fœtus to present in this way are very rare, and probably only occur when the peritoneum is stripped from the anterior abdominal wall by the gradual growth of the fœtus.

* *Trans. Obstet. Soc., London*, vol. xxxiii. p. 148.

The changes which occur in retained extra-uterine fœtuses are considered more fully in chapter xxxiv.

Secondary rupture.—When the pregnancy continues between the layers of the broad ligament, the gestation sac may at any moment rupture, and the risk of this accident, as far as can at present be judged, is much greater when the placenta is situated above the fœtus. As the pregnancy progresses the peritoneum forming the sac becomes stretched and stripped from adjacent parts, and from the viscera. Sometimes as the sac extends into the abdomen it will strip the peritoneum from the anterior abdominal wall, as in the case of an over-distended bladder, only to a much greater extent. This fact was absolutely demonstrated in the specimen from which the drawing (Fig. 102) was prepared; its clinical import is indicated in Sheild's remarkable case. When the serous membrane is stripped from the posterior aspect of the pelvis, the rectum may be deprived of its serous investment, as well as the posterior surface of the uterus, the fœtus and placenta insinuating themselves between these parts, beneath the peritoneum.

At any period between the twelfth week and term the gradually thinning gestation sac may rupture. The effects of this accident vary. When the rent involves the placenta, as is almost certain when this organ is situated above the fœtus, terrible hæmorrhage and a speedy death are the usual consequence if the gestation has advanced beyond the mid-period of pregnancy; before this date the hæmorrhage may not always be so severe, and will afford opportunities for surgical intervention. When the sac bursts into the peritoneum in this way it is spoken of as **secondary intra-peritoneal rupture,** and the anatomical relations of this form of rupture are shown in Fig. 102, with the placenta forming the roof of the gestation sac.

When the placenta occupies the pelvis, and the fœtus the abdominal portion of the sac, the latter may become so slowly thinned that at last it yields, and the fœtus is set free into the peritoneal cavity, and disports itself among the intestines.

It must be remembered that secondary rupture may be indefinitely delayed, and in some cases never occurs. The patient goes to term, passes through a *spurious* labour, the liquor amnii is absorbed, the placenta disappears, and the existence of an extra-uterine pregnancy never suspected until a mummified fœtus or a lithopædion is discovered at the autopsy.

Of the two forms of secondary rupture, the intra-peritoneal variety may occur at any date between the twelfth week and term.

Secondary extra-peritoneal rupture occurs after the death of the child, and is in nearly every case induced by suppuration of the gestation sac.

Secondary intra-peritoneal rupture near, or at term must be discussed more fully, because it is these cases which tend to perpetuate the belief that impregnated ova may tumble into the peritoneal cavity, and engraft themselves upon the serous membrane and develop. A critical inquiry into this matter has convinced me that there is no case on record which can be cited as decisive proof of this occurrence. There is no such condition as a primary peritoneal pregnancy. *All forms of extra-uterine gestation pass their primary stages in the Fallopian tube.*

Lawson Tait* suggests a modification of this view, to the effect that "what have been called abdominal pregnancies are clearly exceptional cases where primary tubal rupture at the end of the third month has not proved

* *Lectures on Ectopic Gestation*, p. 13; 1888.

fatal; where the extruded placenta has made for itself visceral attachments wherever it has touched; or where secondary rupture of a broad ligament cyst has converted an extra-peritoneal ectopic gestation into one within the peritoneal cavity."

This view I cannot bring myself to accept. I am of opinion that these so-called abdominal pregnancies are primary tubal; gradually the tube opens out into the broad ligament, and as it progresses to term the walls of the gestation sac rupture, and the fœtus escapes into the peritoneal cavity, as in the remarkable case recorded by Jessop:—*

A woman twenty-six years of age believed herself two months pregnant; she was suddenly seized with violent pain in the right side of the belly, which caused her to faint. From the effects of this trouble she kept her bed two months. Five months later, at a consultation, it was decided that she was a victim of extra-uterine gestation, and she was admitted into the Leeds Infirmary. As the woman was in a critical condition, abdominal section was performed without delay. On cutting through the anterior wall of the belly, the breech and back of a child thickly coated with vernix caseosa came into view. The child had lodged in the midst of the bowels, free in the cavity of the abdomen. No trace of cyst or membrane could be discovered. The placenta was seen covering the inlet of the pelvis, like the lid of the pot, and extending some distance posteriorly above the brim, where it apparently had an attachment to the large bowel and posterior abdominal wall.

The patient recovered from the operation, and the child lived for eleven months.

From this case nothing positive can be inferred, as

* *Trans. Obstet. Soc., London*, vol. xviii. p. 261.

fortunately the woman recovered, therefore the relation of the placenta to the gestation sac and the condition of the Fallopian tubes could not be ascertained.

Champneys* has described a similar case with great care. The patient was admitted into St. George's Hospital with well-marked symptoms of extra-uterine gestation. In June, 1886, she was seized with sudden cramp-like pain in the left iliac fossa, and was confined to bed for a week. Her medical attendant detected a swelling in the right iliac fossa. From that time until October she suffered constant cramp-like pains in the left iliac fossa, and at this date her condition became so serious that she sought admission into the hospital, and physical examination made it clear that she was the victim of extra-uterine gestation, which had advanced to the seventh month. Operative interference was advised. When the abdominal walls were divided the buttocks of the fœtus were reached. The report then continues:—"No sac was seen over them; the layer immediately covering the fœtus was a dull white membrane. Almost at once, on exposing the fœtus, a coil of pink healthy small intestine rolled over it from the right side. The fœtus was free in the abdominal cavity. No liquor amnii was seen. . . The fœtus was lying head downwards in the left iliac fossa, with occiput posterior and to the left side. The feet were sought, and it was extracted by them—the face being born before the occiput. The patient died on the thirty-second day after the operation. At the *post mortem* the placenta was found lying above the pubes, loose in a sac formed of false membrane, bounded above by the displaced transverse colon, in front and below by the omentum. The sac wall varied in thickness from $\frac{1}{16}$ to $\frac{1}{8}$ of an inch. The pelvic organs were so matted together

* *Trans. Obstet. Soc., London*, vol. xxix. p. 456.

that the relation of parts could not satisfactorily be made out, but the left tube could be seen in its whole extent apparently unaltered. The relations of the right tube to the sac could not be made out."

It is also interesting to notice that in discussing some points in connection with a similar case recently reported by Mr. Taylor,* Dr. Champneys expresses an opinion that Taylor's and Jessop's cases, as well as his own, "might have been tubal or tubo-ovarian."

I have had one excellent opportunity of dissecting the pelvis from a woman who died after the removal of an extra-uterine fœtus, which had escaped from the gestation sac among the intestines. I was able to isolate the displaced layers of the right broad ligament forming the gestation sac, in which a large piece of amnion was retained. The placenta had occupied the pelvis and part of the posterior wall of the uterus, beneath the peritoneum. The corresponding tube and ovary were not detected.

The age of the fœtus and circumstances of the case were on all fours with the cases of Jessop, Champneys, and Taylor.

* *Trans. Obstet. Soc., London*, vol. xxxiii. p. 115.

CHAPTER XXXI.

TUBO-UTERINE GESTATION.

When a fertilised ovum lodges in the section of the Fallopian tube which traverses the uterine wall, it is termed *tubo-uterine gestation.* This variety runs a somewhat different course to the purely tubal form.

Tubo-uterine gestation is somewhat rare; many specimens described as belonging to this class turn out on critical examination to be specimens of cornual pregnancy.

Dr. Robert Barnes* discusses interstitial, or intramural, and cornual pregnancy together, and writes:—"It is convenient to discuss these conditions together. They approach each other so nearly in locality and other characters that they hardly admit of distinct clinical demonstration." The occurrence of tubo-uterine gestation admits of no doubt whatever, and, fortunately, a few specimens exist of this accident which demonstrate its absolute independence of cornual pregnancy. Two specimens, one preserved in the museum of Guy's Hospital, and the other, which has had the advantage of careful investigation by Doran, in the museum of the Royal College of Surgeons, are the most satisfactory and easily accessible examples in London.

The specimen at Guy's is described in the *Reports* of that hospital for 1860 by Dr. Braxton Hicks. The dissection is thus recorded:—"Uterus enlarged to six inches long, and three and a half to four inches in diameter

* *Clinical Lectures on the Diseases of Women*, p. 444; 1873.

at the widest part. A ragged rupture appeared on the fundus, rather towards the left side, from which blood had poured. The uterine walls had increased in thickness to about an inch and one-eighth at the widest part.

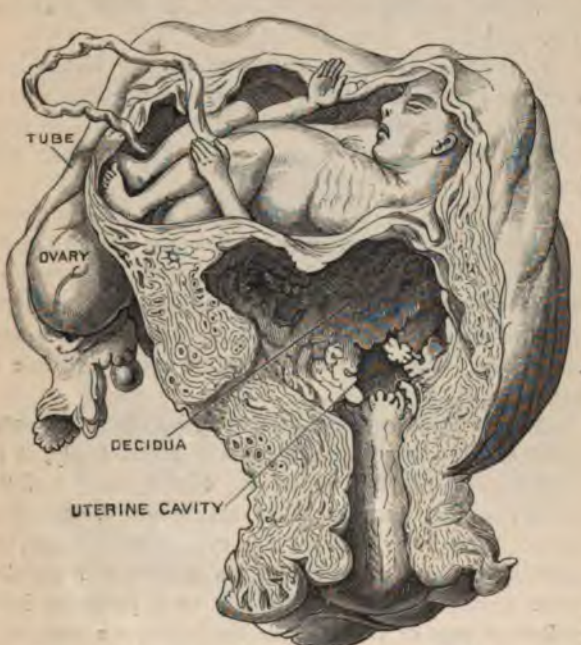

Fig. 103.—Tubo-uterine Pregnancy. (Museum, Guy's Hospital.)

"A cavity about three inches in diameter (when collapsed) was situated in the substance of the wall of the fundus, adjoining the left Fallopian tube. This cavity had extended the walls externally so as to be apparent there, and had also encroached on the cavity of the uterus, on the left side of the fundus. The walls of the cavity all round were formed of uterine tissue. The wall

separating it from the uterine cavity was about one-sixth of an inch in thickness. An examination of the specimen shows that the cavity of the gestation sac is directly continuous with the tube. The walls of the sac bulge into the uterine cavity, which is lined by thick decidua" (Fig. 103).

In Doran's specimen the uterus was five inches long from the fundus to the external os, and appears unsymmetrical, on account of the bulging of the cyst at its right upper corner. The uterine cavity was lined with decidua.

The right side of the fundus is dilated, and rent asunder by a long ragged aperture measuring two and a half inches when unstretched. The cavity thus exposed measures one inch and a half vertically, supposing the edges of the rent to be closed, and one inch antero-posteriorly. The walls are very thin along the line of laceration.

Anteriorly, the round ligament springs from the outer aspect of the exposed cavity, which bulges freely, at its lower aspect, into the upper part of the interior of the uterus; at this part its walls are much thicker than above. The inner wall of the cyst is very rough, resembling to a certain extent an auricular appendix. From some of its numerous pits or depressions hang broken-off tags of chorion, but there is not a trace of a distinct decidua.

The right Fallopian tube passes into the outer and anterior aspect of the walls of the cyst, expanding slightly into a funnel-shaped orifice, which opens into the cavity of the cyst, close to the rent in its walls. A stout bristle introduced into the tube from without passes readily into the cavity through the funnel-shaped orifice, which is lined with very smooth mucous membrane. On the outer surface of the portion of the cyst that projects

into the uterine cavity is another funnel-shaped aperture with a smooth lining. A bristle passed from without, through this opening, enters the cavity of the cyst without

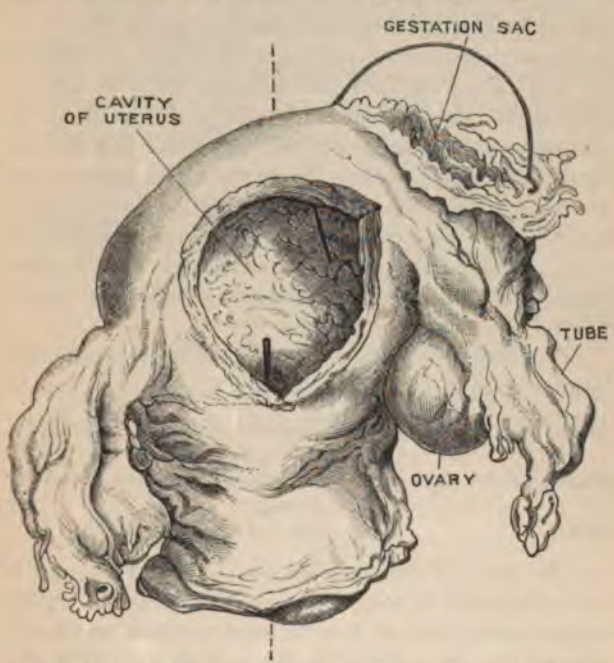

Fig. 104.—Tubo-uterine Pregnancy: the Gestation Sac ruptured at the month (Museum, Royal College of Surgeons.)

the slightest obstruction. There is no evidence of rupture of the wall of the uterus out of the line of the tube, as it runs through the uterine tissue into the uterine cavity. Still less is there any ground for believing in a partially bicornuate condition of the uterus (Fig. 104).

This uterus was obtained from a woman aged thirty-two years: she died in about ten hours after rupture of the

cyst. An embryo, enveloped in membranes, and corresponding to the second month of development, was found floating in blood in the abdominal cavity.

Tubo-uterine gestation differs in its course, anatomy, and modes of termination from the purely tubal form. In dealing with the anatomy of a gravid tube, it was pointed out that as the gestation sac enlarged its walls became thinned; in the tubo-uterine variety the walls of the gestation sac become greatly thickened, and this thickening extends to and involves the uterus. This hypertrophic condition of the walls of the sac explains the circumstance that whilst in the purely tubal form the sac ruptures very early,—usually about the eighth week, and never deferred beyond the twelfth—in the tubo-uterine variety it may be delayed much beyond this date.

The date of rupture in three carefully authenticated cases is given in the subjoined table :—

Braxton Hicks*	The development had probably proceeded to the end of the fourth month.
Lawson Tait†	The patient thought she had turned the fourth month.
Doran‡	About the end of the second month.

The sac of a tubo-uterine gestation may rupture in two directions. It may burst into the peritoneal cavity, and be rapidly fatal, or into the uterine cavity, and be discharged like an ordinary uterine conception. It is also an important fact to bear in mind that in this variety the sac does not rupture in such a way as to allow of the embryo being dislocated between the layers of the mesometrium.

An examination of the clinical details of cases of

* *Guy's Hospital Reports*, series iii. vol. vi. p. 275
† *Ectopic Pregnancy*, p. 46.
‡ *Trans. Obstet. Soc., London*, vol. xxiv. p. 227.

undoubted tubo-uterine gestation indicates that intra-peritoneal rupture of the sac is more rapidly fatal than the tubal form, and this is due to the greater amount of hæmorrhage, because not only are the walls of the gestation sac thicker, but the rent often extends to, and even involves the uterine wall.

As a means of ready reference, the points in which the two varieties of tubal gestation differ from each other are arranged in tabular form :—

	TUBAL.	TUBO-UTERINE.
Frequency.	Very common.	Very rare.
Gestation sac.	Walls are very thin.	Walls very thick.
Termination.	(*a*) Intra-peritoneal rupture.	(*a*) Intra-peritoneal rupture.
	(*b*) May rupture into the mesometric space.	(*b*) May rupture into uterine cavity, and be discharged through vagina.
	(*c*) May abort.	
Date of rupture or abortion.	At any date from the 3rd to 12th week.	At any date from the 8th to the 20th week.

CHAPTER XXXII.

CORNUAL PREGNANCY.

SINCE Kussmaul demonstrated beyond dispute that many cases of supposed tubal gestation were really examples of pregnancy in a rudimentary cornu of a bi-horned uterus, the subject has been carefully studied, and many descriptions of this accident have been placed on record.

In order to comprehend clearly the significance of bicornuate uteri, we must briefly consider the development of the uterus.

In the mammalian embryo, at a very early date, two longitudinal tubes, known as Müller's ducts, lie on the dorsal wall of the abdomen. Each duct opens anteriorly into the peritoneal cavity, and posteriorly into the cloaca. These represent the oviducts of many fish, all reptiles, and birds. In the male they usually atrophy, and only vestiges of them persist in the adult. In the human female these ducts approach each other, and coalesce in their posterior two-thirds. For a time the cavities remain distinct, but gradually the septum atrophies and leaves a median chamber, which communicates with the peritoneal cavity by two narrow ducts—the Fallopian tubes—and opens into the vagina by a single passage, called the cervical canal. The median chamber is known as the uterine cavity.

During embryonic life the development of the uterus may be arrested in a variety of ways, and give rise to malformations of great practical interest.

The ducts may coalesce, but fail to communicate;

each growing equally will produce what is termed a double uterus and vagina. This variety is termed *uterus duplex bicornis*. In this form of uterus the recto-vaginal pouch is divided by a median fold of peritoneum into a right and a left recess. In some specimens the fold will pass between the two halves of the uterus, and divide the utero-vesical pouch.

In order to produce a normal uterus, the two Müllerian ducts should be equally and fully developed. In some individuals one duct grows at a proper rate, whilst its fellow remains stunted, producing an unicorn uterus.

Unicorn uteri differ much in the degree to which the rudimentary cornu is developed. They are all similar in having the miniature cornu attached to its fully-developed fellow near the upper end of the cervix, and in the peculiar shape of the ovary which is attached to the diminutive cornu, for it is elongated, and resembles in shape a gherkin. The thickest part of these rudimentary cornua is near the attachment of the round ligament.

It would be far beyond the scope of this little work to describe the morphology, pathology, and clinical import of malformed uteri: but the subject of tubal pregnancy cannot be discussed without some reference to cornual pregnancy, especially those cases in which it occurs in a rudimentary cornu. A full discussion of the subject would demand much time and space.

When pregnancy takes place in one horn of a well-formed bicornuate uterus it goes on to full term, and ends as happily as if the organ were of normal shape. When one horn only is gravid—and this is the usual thing—the non-gravid half becomes much enlarged; in this it resembles the increase in size of the uterus when the Fallopian tube is occupied by a developing ovum, but there is this difference:—*In tubal pregnancy a decidual*

membrane forms, not in the tube, but in the uterus; in

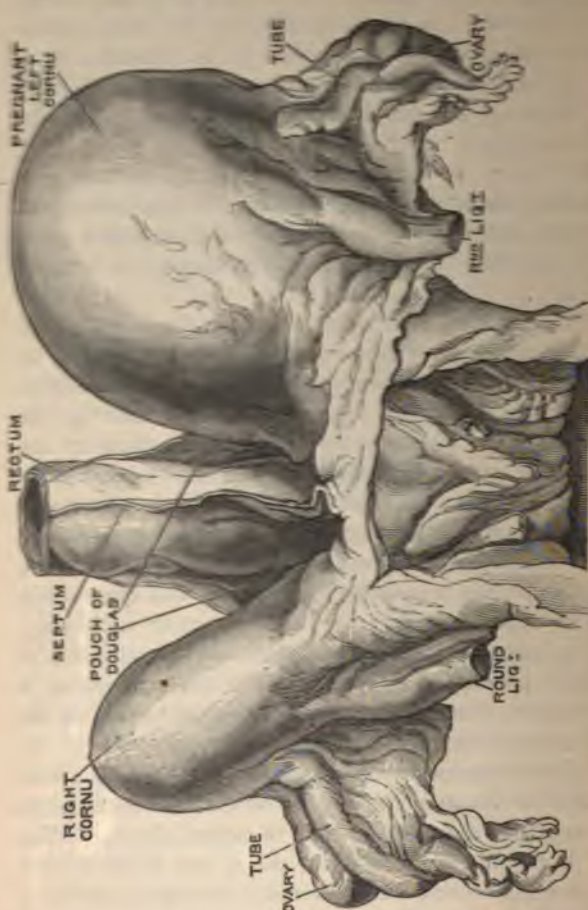

Fig. 105.—Bicornuate Uterus (*Uterus bicornis unicollis*) three days after delivery, to show enlargement of both cornua, when one-half is gravid. (Museum of St. Mary's Hospital.)

bicornuate uteri the decidua is formed in the impregnated cornu. There is reason to believe that a decidua forms

in the unimpregnated cornu, but this requires closer investigation than it has yet received in order to absolutely exclude the possibility of twin pregnancy.

The enlargement of both cornua when only one is impregnated is well shown in Fig. 105, from a specimen described by Dr. Handfield Jones. The same condition may be studied in those mammals normally furnished with bi-horned uteri.

Gestation in such uteri is rarely a source of trouble, but when an impregnated ovum is lodged in the rudimentary cornu of an *unicorn uterus* it is often attended with disastrous consequences to the individual.

Kussmaul, in his classical work on *Malformations of the Uterus* (1859), collected thirteen cases of what he regarded as pregnancies in the rudimentary cornua of unicorn uteri. In a few of the cases the original authors had recognised the nature of the specimens, but the majority had been reported as tubal pregnancies.

Since the publication of Kussmaul's book a few examples of this condition have been placed on record. Of these, the most carefully described are those reported by Virchow, Luschka, and Professor Sir William Turner.

Virchow's case is of importance, because he points out a useful means of distinguishing between a tubal pregnancy and gestation in a rudimentary uterine cornu, in regard to the insertion of the round ligament. The rules may be summarised thus :—

1. In a *normal uterus* the *round ligament* springs from the upper angle, immediately in front of the tube.
2. In *tubal gestation* the *round ligament* is attached to the body of the uterus, on the uterine side of the gestation sac.
3. In *cornual pregnancy* the *round ligament* is situated on the outer side of the gestation sac.

Turner's specimens are interesting in relation to these points. The first consisted of the uterus and appendages which were obtained from a woman aged twenty years, who had died with all the signs characteristic of a tubal gestation which had ruptured. The parts were sent originally to Sir James Simpson, who placed them in Turner's hands for dissection. The latter soon came to

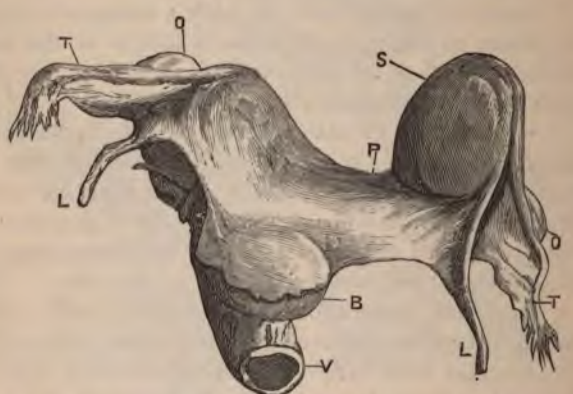

Fig. 106.—Pregnancy in a Rudimentary Uterine Cornu. (After Turner.)
V, Vagina; B, bladder; O, ovary; T, tube; L, round ligament; S, gestation sac; P, pedicle.

the conclusion that he had to deal with pregnancy in a bicornuate uterus. Fortunately, the description is rendered clear by a good drawing (Fig. 106). Connected with the vagina was the cervix uteri, which communicated with the right cornu of the uterus. This cornu was inclined obliquely upwards and to the right, and terminated in a rounded end. It was invested by peritoneum in front, behind, and to the left side; on the right side this membrane formed the folds of a right mesometrium.

The length of the cornu from the external os to the cornual apex was 10 cm., and its greatest width 5 cm.

The right round ligament, Fallopian tube, and ovary, with its ligament, were attached to the summit of this cornu, and had the same relation to each other as in a normal uterus.

The Fallopian tube, with its fimbriæ, was 12 cm. long. The parovarium could be made out in the mesosalpinx. The walls were thicker than in a normal uterus, and the cavity contained a thick firm decidua, but no fœtus; the cervical canal was occupied with a mucous plug.

Springing almost at a right angle from the left side of the right cornu, close to its junction with the cervix, was a flattened band which served as a pedicle of attachment for the left cornu. This pedicle extended upwards for 3 cm., and then expanded into the dilated portion of the left uterine cornu. The pedicle was invested with peritoneum, and consisted of muscular fasciculi, arteries, and veins. The horn was pyriform in shape, and its greatest circumference was 23 cm. Along its outer and posterior part there was a rupture 8 cm. long, through which a fœtus and its membranes were extruded. To the apex of this horn the round ligament, Fallopian tube, ovarian ligament, and ovary were attached. The Fallopian tube was 12 cm. long, including the fimbriæ; air blown into the tube entered the cornu. The parovarium occupied the mesosalpinx, and one of its tubules was dilated into a cyst the size of a hazel-nut. The ovary contained a corpus luteum. The round ligament was expanded at its origin, and extended from close to the Fallopian tube down to the pedicle. The wall of the cornu was muscular, like that of a pregnant uterus. The pedicle was most minutely examined to see if any canal connecting the cavity of the impregnated horn with that of the right horn, or the cervix or vagina, could be seen. No orifice was detected in or at either end of the pedicle.

This specimen bears out Virchow's rules regarding the relations of the round ligaments and Fallopian tubes.

That the tests founded on the relation of the round ligament to the gestation sac are very useful is well shown in the second case described in Turner's paper. After making out the nature of the first case, he obtained Simpson's permission to examine other examples of supposed tubal pregnancies contained in his collection; among them he found the following specimen:—

The parts included an empty uterus, with its appendages, taken from the body of a married woman thirty-five years of age, by Dr. Scott, of Dumfries, and sent to Sir James Simpson. Six months before her death the woman, supposed to be pregnant, was seized with labour pains, which continued for several days. These pains subsided; the patient subsequently went about as usual, and the swelling of the abdomen gradually subsided to about one-third the size it was at the time of the unavailing labour. Six months later she died from phthisis.

The preparation, when it came into Turner's hands, had been lying a long time in spirit. He found a large irregular ovoid sac 68 cm. in circumference, containing a male fœtus at apparently the full time attached by a funis, 30 cm. long, to a shrivelled placenta connected with the inner surface of the sac. The gestation sac was affixed by a pedicle to the cervix uteri. On examining the other parts of the specimen, the upper part of the vagina was recognised with a cervix uteri projecting into it in the usual manner. The cervix was continuous with a right uterine cornu. The cavity of the cornu formed with the cervical canal an obtuse angle. The cornual cavity led into the right Fallopian tube. The tube was 6 cm. in length.

The gestation sac was connected to the left side of the cervix by a strong muscular pedicle, 5 cm. in length and 2 cm. in width. Standing from the wall of the sac were the Fallopian tube and round ligament. The tube was 13 cm. in length, and a fine probe could be passed from its abdominal ostium to the sac wall. The round ligament arose from the sac wall anterior to the tube. The ovary was flattened, and the mesosalpinx contained a parovarium. No communication could be made out connecting the gestation sac with the vagina, cervical canal, or right uterine cornu.

The contents of the gestation sac presented the following characters :—

Large tracts of the fœtal tissue had been destroyed; in the dorsal region a large patch of skin with the subjacent muscles had disappeared; the ribs and laminæ of the vertebræ were exposed.

The placenta was tough and shrivelled. The walls of the sac were thin; in places the muscle fibres had disappeared, and large calcareous plates were distributed over its inner wall.

The imperforate condition of the pedicle in specimens of this kind has led to a good deal of vague speculation as to how the contained ova became fecundated. To explain it the theory known as the "transmigration of the ovum" was advanced. It is unsupported by facts, and quite unnecessary, for we may take it for granted that the channel of communication between the rudimentary cornu and cervical canal becomes occluded subsequent to impregnation.

The specimens of pregnancy in rudimentary uterine cornua just considered illustrate very well two of the points in which this abnormal form of pregnancy differs from tubal gestation. In the latter form the tube always ruptures before the twelfth week, whereas in cornual

pregnancy the gestation may go on to full term, and then ineffectual labour leads to the death and subsequent mummification of the fœtus; or the gestation sac may rupture at any period from the second to the ninth month.

There is reason to believe that a gravid uterine cornu may, in the human subject, undergo *axial rotation*. The accident is fairly common in the lower mammals.

It has been stated by writers on cornual pregnancy that the corpus luteum of pregnancy has been found in the ovary on the side opposite to the gravid cornu. To explain this it has been imagined that the tube reached across the middle line and grasped the opposite ovary, or the ovum, after leaving the gland, say of the left side, entered the tubal ostium of the right side. Such guesses do not call for serious consideration.

Pregnancy in one horn of a bicornuate uterus sometimes gives rise to difficulty in diagnosis, mainly on account of the unilateral position of the gravid horn.

In the reported cases of mistaken diagnosis the error consisted in regarding the tumour as a uterine myoma.

Angus Macdonald has described very fully a case of this kind which occurred in a woman twenty-three years of age. He believed the tumour to be a rapidly-growing uterine myoma. Acting on this opinion, abdominal section was performed. During the operation it was discovered to be a fœtus-containing tumour, and subsequently the nature of the case was clearly made out. The gravid cornu was amputated, and the patient made a good recovery. The fœtus had been dead several months.

Amand Routh has described a specimen of unicorn uterus in which a myoma had developed in connection with the undeveloped horn.

Literature of cornual pregnancy.—Kussmaul's classical work,

published in 1859, contains the more important cases up to that date. In our home literature the following cases may be consulted:—Turner: *Edin. Med. Journal*, 1866, vol. xi. p. 971; Struthers: *Edin. Med. Journal*, vol. vi. p. 145; Routh: *Trans. Obstet. Society, London*, vol. xxix. pp. 2 and 58; Jones (Handfield): *Ibid.*, vol. xxix. p. 146; Macdonald: *Obstet. Trans., Edin.*, vol. x. p. 76. This paper contains some references to Werth's and Litzmann's case referred to below.

In addition, consult also—Virchow: *Monatschrift für Geburtskunde*, 1860; Schroeder: *Krank. der Weib Geschlechtorgane*, 1886; Luschka: *Monatsch. für Geb.*, 1863; Werth and Litzmann: *Arch. für Gyn.*, Bd. xvii. s. 281.

CHAPTER XXXIII.

TWIN GESTATION: ONE FŒTUS INTRA- THE OTHER EXTRA-UTERINE.

REPEATED EXTRA-UTERINE GESTATION.

THE concurrence of tubal and uterine gestation is very rare; but instances of this combination have been recorded. Mr. L. R. Cooke* reported a case of this kind. He attended a woman, aged thirty-nine years, whose labour was difficult in consequence of a tumour behind the uterus. Mr. Spencer Wells, who saw the case, recognised the sound of two fœtal hearts. After much difficulty, Dr. Greenhalgh, who was consulted in the case, extracted a child from the uterus. Two days later the patient died, and at the *post mortem* examination, which was attended by Dr. Greenhalgh, Spencer Wells, and others, a full-grown fœtus contained in its membranes was found. "Beneath the tumour the uterus was seen contracted and *unruptured*." The anatomical details are not given in full; those who saw the dissection believed it to be an example of *uterine and extra-uterine pregnancy progressing simultaneously to the full period of gestation.*

Dr. Sale† has described a case of this kind which occurred in a negress twenty-two years of age. Extra-uterine gestation was diagnosed, and abdominal section performed for its relief. After removal of the fœtus from the extra-uterine sac, the uterus was recognised; it was

* *Trans. Obstet. Soc., London*, vol. v. p. 143.

† *New Orleans Med. and Surg. Journal*, Oct., 1870; and *Am. Journal of Obstet.*, vol. xiii. p. 832.

"large and globular, as if impregnated." The uterus was opened, and another living child, with its placenta, removed. The patient died on the fourth day after the operation. There was no autopsy.

Dr. Wilson* gives a detailed account of a case in which this rare combination existed. The patient was twenty-four years of age, the mother of three children. In April, 1880, she gave birth to a fourth child at the eighth month. The midwife came to the conclusion that there was another fœtus, and sought medical advice. It was eventually concluded that the second child was extra-uterine; the movements of the child could be felt, and the sound of the fœtal heart was plainly audible. It was difficult to decide whether this child was outside the uterus or contained in the horn of a bicornuate uterus. In relation to this point, Dr. Wilson mentions that on one occasion Dr. Goodell diagnosed extra-uterine pregnancy, and had appointed a day for the operation; in the meanwhile the woman was taken in labour and delivered naturally of a living child. She had a double uterus.

In Dr. Wilson's patient abdominal section was performed; the child was extra-uterine, and the report states that the sac "was so fragile at the point of incision that I wondered why the child in its motions had not ruptured it before."

The placenta was left, but grave symptoms supervening, an unsuccessful attempt was made to remove it. The patient died suddenly ninety hours after the operation.

In 1881 Dr. Galabin† recorded an instance of this which happened in a patient thirty-six years of age.

* *Am. Journal of Obstet.*, vol. xiii. p. 821.

† *Trans. Obstet. Soc., London*, vol. xxiii. p. 141.

The history suggested the case to be an ovarian cyst complicated with pregnancy, and that the cyst had ruptured. A combined intra- and extra-uterine gestation was regarded as possible. Dr. Galabin performed abdominal section. On opening the peritoneum a fœtus was discovered enclosed in its membranes lying to the right side of, above, and somewhat behind the uterus. The placenta appeared to be spread out very widely, and attached chiefly to the posterior surface of the right broad ligament and of the pregnant uterus. The placenta was not disturbed. Two days later labour pains came on, and the intra-uterine child was delivered ; it was dead.

The patient continued to lose blood from the extra-uterine sac, and died three days after the operation. No autopsy was allowed.

Several similar cases have been recorded in periodical literature, but the four cases thus briefly mentioned illustrate the leading points in the clinical history of this accident. Its gravity is sufficiently obvious, for in all the reported cases the patients died within a few days of the operation. The great difficulty in this, as in all other examples of advanced extra-uterine gestation, is the excessive risk of hæmorrhage which follows interference with the placenta, and the very great danger the patient runs of dying from septicæmia if it be allowed to remain. A distinction must be drawn between *concurrent* intra- and extra-uterine gestation and intra-uterine gestation *subsequent* to tubal pregnancy.

Repeated tubal gestation.—Parry has grouped under this heading several cases of "women who have been known to bear more than one extra-uterine child;" but it may be at once stated that of the nine cases adduced by Parry not one can be regarded as of the least value in establishing such an occurrence. Indeed, in one instance he is so credulous as to believe that tubal

pregnancy may happen twice in the same tube. The case in question is reported in great detail by Dr. Haydon, whose account is supplemented by a report on the specimen, signed by Drs. Tyler Smith and Braxton Hicks.* This paper is illustrated by a plate, from which it seems exceedingly probable that the patient had a bicornuate uterus. Repeated gestation in the same tube is an impossibility, for the pregnancy produces such gross changes as to render it functionless.

Instances reported as repeated tubal gestation are of no value when the evidence rests merely on physical signs. True knowledge must rest on such facts as in the following case:—

McG——, aged twenty-eight years, was admitted into the London Hospital January, 1887, and underwent abdominal section for tubal gestation which had ruptured into the peritoneal cavity. In this operation Dr. Herman removed the right tube.

In December, 1888, the patient was again in the hospital, suffering from enteric fever. She was re-admitted into the hospital on May 13th, 1890. Menstruation occurred for the last time in February, and having since often felt sick, she thought she was pregnant. She was very low-spirited, and this circumstance led to her seeking advice. On May 10th she had slight vaginal hæmorrhage. She had had no pain except that produced by the vomiting.

On vaginal examination the uterus was found in the normal position, and quite movable. To the left of and behind the uterus was a swelling about as large as the uterus, and moving with it. The patient was fat and not anæmic, and there were no signs of disease elsewhere.

* *Trans. Obstet. Soc., London*, vol. v. p. 280.

The clinical history and the physical signs pointed to a pregnancy in the left tube. Its removal by operation was therefore advised, and performed on May 17th. The abdomen was opened by an incision in the line of the former one. When exposed, the left tube was seen as a purplish-red, elongated, ovoid swelling, lying by the side of the uterus, and having its long axis parallel with that of the uterus. It was connected to the uterus by soft, easily broken-down adhesions. These were easily separated, the broad ligament transfixed and tied, and the tube removed entire along with the ovary. Under the compression used in its removal, blood spirted from a little hole not larger than a pin puncture. The peritoneal cavity was washed out with water. Some recent clot was found at the bottom of the recto-vaginal pouch, but as the tube was entire, this may have come from separated adhesions or from the wound.

The tube removed measured 2½ inches long by 1½ inch across. When cut open, a fœtus about a third of an inch long was found within it. Its interior was mammillated, just like the interior surface of an apoplectic ovum, and the amniotic cavity contained an embryo. Its wall, on section, was three-eighths of an inch thick, and to the naked eye resembled the thrombosed placenta of an extra-uterine gestation some time after the death of the child.*

The details of an equally convincing case, reported by Lawson Tait, are briefly these :—

A woman twenty-five years of age came under his care in 1885, suffering from severe abdominal trouble. She believed herself pregnant. Menstruation had been suspended for three months. When the woman was seen by Mr. Tait she looked extremely ill and anæmic ;

* *British Med. Journal*, 1890, vol. ii. p. 722.

on the previous day she had had an attack of fainting, accompanied by vomiting. A large ill-defined mass existed on the right side, and intimately associated with the uterus. The case was regarded as one of tubal pregnancy, which had ruptured. Abdominal section was performed, and a ruptured gestation sac, fœtus, and placenta were removed. The patient made a rapid recovery.

Eighteen months after this operation she was confined of a child at full term. About fifteen months after this confinement she again became pregnant. After turning, according to her computation, the fourth month, she was suddenly seized, whilst in the act of stooping, with acute pain and a feeling of faintness. Stimulants were administered and every effort was made to restore her, but she died in five hours from the commencement of the attack. At the *post mortem* examination the abdomen was found full of blood-clot which had come from a rent in the uterine wall. The uterus was removed and carefully dissected. The ovum had been lodged in the uterine section of the left tube. The account of the anatomy of the parts and the drawing which illustrates it show the gestation to belong to the tubo-uterine variety. The stump of the right tube was clearly made out, and a fine probe could be passed into it from the cavity of the uterus. The uterine cavity was lined by a decidua.*

Twin tubal gestation.—This may be interpreted in two senses: it may signify gestation running concurrently in each tube or two embryos in one tube, that is, twin pregnancy in the ordinary acceptation of the term. Of twins developing in tubal pregnancy we have no trustworthy evidence.

* *Lectures on Ectopic Pregnancy*, p. 46; 1888.

Gestation occurring simultaneously in both tubes of the same patient is possible, although evidence for it is not abundant. A case worth mention in this direction has been reported in Australia. Dr. T. Rowan* relates briefly *six cases of tubal pregnancy*. The most important occurred in a woman twenty-nine years of age, who was seized with typical signs indicating primary rupture of a gravid tube. During the operation both tubes were found distended; the left ruptured during removal. The right tube was dilated to the size of a hen's egg, and when cut open revealed a large piece of placental tissue firmly adherent on one side, and quite free elsewhere. No sign of an embryo was discovered. Dr. Rowan had no doubt that it was "a tubal pregnancy of some six or seven weeks, which was undergoing retrograde changes."

On the left side the tube was dilated into a cyst the size of an orange: it was filled with grumous blood.

The evidence in this case, though strongly suggestive, is not sufficiently precise to establish the existence of a pregnancy in each tube. There is little doubt that some decisive example of this coincidence will before long be forthcoming.

Twin conception in extra-uterine gestation.—Dr. Robert Barnes† writes:—"It has struck me as remarkable how often in tubal gestation twins have been found." He then hazards the following guess:—"May it not be that two ova may obstruct each other in their passage along the tube?"

Parry‡ takes up the hint, and writes:—"Among five hundred cases of extra-uterine conception, collected without any selection, there were twenty-two cases of

* *Australian Med. Journal*, 1890, p. 265.
† *Clinical Lectures on Diseases of Women*, p. 421.
‡ *Extra-uterine Pregnancy*, pp. 27 and 138.

combined intra- and extra-uterine pregnancy. In other words, in round numbers, two ova were fertilised at the same time in one out of every twenty-three gestations. Churchill, the highest statistical authority upon obstetrics who has written in our language, says that there is one twin in every seventy-five conceptions among British matrons, one in one hundred and eight among the French, and one in every eighty-seven among German: or an average of one in ninety among the mothers of the three countries. From these data it would follow that twin conceptions are about four times as frequent in extra-uterine as they are in normal fœtations."

In another part of the book Parry puts it in a somewhat different way. He writes:—"Attention has been called to the fact that twin conceptions are much more frequent in extra-uterine than they are in normal gestations. It is a striking fact, however, that both children are rarely developed in the same locality. In a large majority of these tubal conceptions one ovum finds its way into the interior of the uterus, while the other is arrested at some point in its descent. This fact has led Professor Barnes to believe that twin conception is one cause of extra-uterine gestation."

A critical study of the cases referred to by Parry shows that he not only founded his opinion on untrustworthy reports, but that he confounded together three distinct conditions:—

1. *Concurrent tubal and uterine gestation.*
2. *Twin gestation in a Fallopian tube.*
3. *Uterine gestation subsequent to tubal pregnancy.*

The first condition has already been discussed in this chapter; also the question of twin gestation in one tube, as well as gestation occurring concurrently in both tubes.

The third section is of some interest, and will be considered in the ensuing chapter.

CHAPTER XXXIV.

RETENTION OF THE FŒTUS.

In tubal pregnancy the life of the embryo is, as has been shown in the immediately preceding chapters, very precarious. Yet in the face of all these possibilities the gestation may run on to term. Then symptoms of labour set in, and as delivery by the natural channels is an impossibility, the gestation sac may rupture into the peritoneal cavity, with all its attendant evils. Escaping this catastrophe, the fœtus dies, and may remain quiescent or give rise to various forms of disturbance.

In the more fortunate cases the unavailing labour is followed by absorption of the liquor amnii, and the tissues of the fœtus may become *mummified*, or partially calcified to form a *lithopædion;* the soft parts may be converted into *adipocere*, or the tissues may *decompose*.

Mummification.—To produce this condition the fluid parts become absorbed, and the soft parts are converted into dry tough tissue, so that the fœtus resembles a mummy, or the dried cats so commonly found under the floors of old dwellings.

The characters of such a fœtus are well shown in Fig. 107. "It is a fœtus almost completely developed, but compressed and dried, so that little more than the bones remain to indicate its previous form. It is reduced to a flattened irregular mass, about four inches long and from two to three inches wide. The general form of the head and the outlines of its several bones, as well as some of the ribs, the fore-arms and hands, the

knee-joints, and parts of the lower extremities, are distinct; but the parts between them are shrivelled and partly calcified. The fœtus was removed by operation from the

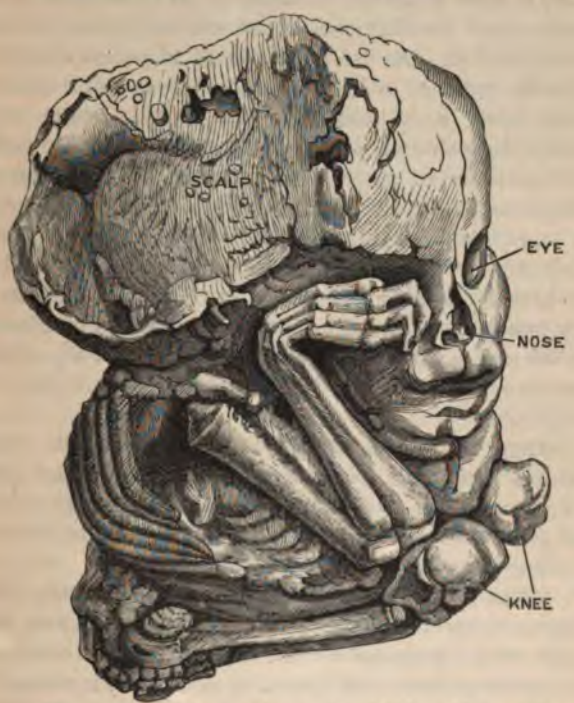

Fig. 107.—Lithopædion. (Museum, Royal College of Surgeons.)

Fallopian tube (as it was believed) of a woman in whom it had been retained more than fourteen years beyond the ordinary period of gestation."

Adipocere is a peculiar substance, intermediate between fat and wax; usually it is white in colour, and is chemically an ammoniacal soap, being formed by the union

of a fatty acid with ammonia. The formation of adipocere depends therefore on the presence of fat, the ammonia being supplied by the decomposition of the tissues. Fully-formed adipocere is structureless, but unchanged tissue, such as fragments of muscle and bone, may be mixed with it. As the formation of adipocere depends upon the presence of fat, it naturally follows that it should occur easily in the fœtus, which at and near term contains a thick stratum of fat immediately beneath the skin. The presence of water is necessary for the formation of adipocere; hence this process takes place in bodies lying in damp soil or in water. Concerning the length of time necessary for this change to take place in dead bodies we have no positive knowledge, but it requires at least a few months; it is probable that the encystment of a fœtus in soft and moist tissues between the layers of the mesometrium is a condition favourable for the formation of adipocere.

There is a circumstance in connection with these fœtuses which are partially or wholly converted into adipocere which is of some practical importance: this is the great tendency they exhibit to adhere to the tissues forming the wall of the sac in which they lie.

When a fœtus is converted, wholly or partially, into adipocere, or mummified, its superficial parts and the walls of the gestation sac are liable to become calcified. A fœtus encrusted with lime-salts in this way is termed a **lithopædion.** In some specimens parts of the fœtus are converted into adipocere, whilst other parts, even the internal organs, undergo calcification, or portions may be calcified, and subsequently mummified.

The most remarkable case of retention of an extra-uterine fœtus on record is the one described by Cheston*

* *Medico-Chir. Trans.*, vol. v. p. 104.

in 1814. In 1738 a woman was taken in labour with her fourth child; the doctor in attendance declared it could not be delivered without the aid of instruments. To this the patient would not consent, declaring that rather than submit to instrumental delivery "she and the child should die together." The child did not come away, and the patient survived the accident fifty-two years, and died in 1790, at the age of eighty years. Before death she had arranged that the body should be examined. At the dissection a lithopædion was found in the pelvis. A portion of the specimen is preserved in the museum of the Royal College of Surgeons.

In 1881 Doran re-investigated the specimen, at the suggestion of Dr. Robert Barnes.* He found the abdominal and thoracic viscera quite soft, but impregnated with lime-salts. The integuments and subcutaneous tissue of the front of the thorax and abdomen are very thick and infiltrated with lime-salts, so as to feel gritty. The integument and subcutaneous tissues of the posterior part of the trunk are very thin, and converted into hard calcareous plates.

Dr. Barnes, in the same paper, drew attention to a similar specimen preserved in the museum of St. Thomas's Hospital. In this instance the specimen had been retained in the abdomen forty-three years. It was carefully investigated by Mr. Stewart. It has all the appearance of an embryo which had reached full development. It was doubled up and compressed into a ball, enveloped in a sac, which fits so closely to its limbs, trunk, and head that no more than the general outline of the parts could be made out. This envelope consists of the cyst wall and membranes; the parts

* "On the so-called Lithopædion;" *Trans. Obstet. Soc.*, vol. xxiii. p. 170.

generally have undergone "adipocerous and cretaceous metamorphosis." The skin of the fœtus had also become calcified, and the deeper parts, including the viscera, were found more or less impregnated with lime-salts. The term *lithopædion* does not signify that the fœtus is converted into stone, but that its tissues are impregnated with lime-salts—that is, *calcified*.

Unfortunately, the majority of fœtuses sequestrated in the mesometrium do not remain quiescent, for the proximity of the intestinal tract leads to adhesion of the intestines, especially the rectum, to the sac wall, and in many cases the tissues dividing them become so thin that gases from the bowel find their way into the sac and set up decomposition of the fœtal tissues, and cause suppuration.

This is a matter of some interest, for it has been many times asked—How is it that in some cases an extra-uterine fœtus seems quite fresh, even after it has been dead for months, or remains innocuous as a lithopædion, whilst in many it decomposes rapidly, and becomes surrounded by pus? The answer is simple enough: so long as the fœtus is excluded from contact with air or intestinal gases, it is as safely preserved as a specimen in an air-tight jar, but as soon as air is admitted, or gases from the intestines gain access to it, putrefactive changes at once begin.

The length of time a dead fœtus may remain *quiescent* in the mesometrium is, of course, impossible to determine; and though it may remain long enough to undergo conversion into adipocere, or even become a lithopædion, it may, even years after, decompose. Whether this event follows within a few weeks, or be delayed months, or perhaps years, the effects produced by it are much the same. A collection of pus forms in the cavity, and, as in an abscess in the broad ligament arising from other

causes, the pus attempts to find an outlet along the lines of least resistance. Thus it may open into the rectum; this would appear to be the most frequent direction. Often the pus will burrow its way through the vagina,

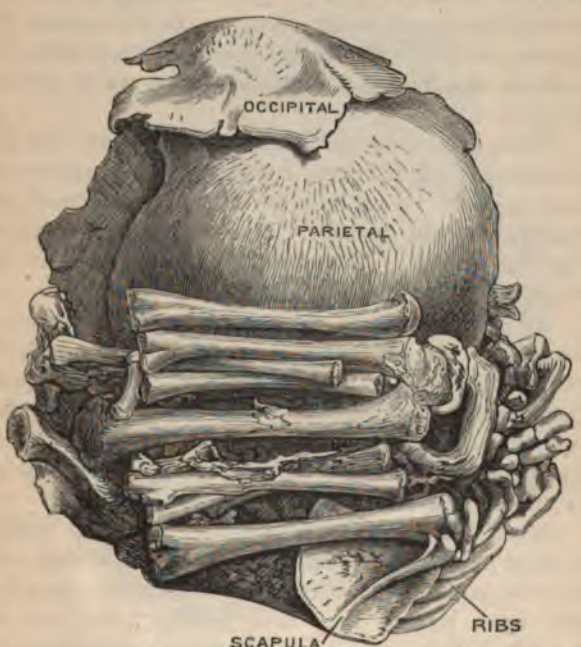

Fig. 108.—Mass of Fœtal Bones from a case of Extra-Uterine Pregnancy. (Museum of the Middlesex Hospital.)

All the soft parts and the cartilages from the ends of the bones have decayed.

and not uncommonly makes its way into the bladder. Gervis* has recorded a case in which the abscess opened into the uterine cavity, and the bones discharged through the cervical canal. Sometimes such abscesses present

* *Medico-Chir. Trans.*, vol. lxx. p. 35.

immediately above Poupart's ligament, and even point at the umbilicus. In whichever way they attempt to gain the surface, we find that a sinus forms allowing of the escape of pus, and sooner or later fragments of the fœtus, especially the shafts of the long bones or portions of the vertebræ, escape from the opening. In some cases the discharge of pus, which at first is very free and offensive, gradually diminishes, and leaves a sinus which persists for years.

When such cases are examined after death, the old gestation sac is found firmly contracted on a conglomerate mass of fœtal bones, without the least particle of soft material, or even cartilage. Such a mass is sketched in Figs. 108 and 109. The specimen is preserved in the museum of the Middlesex Hospital.

An examination of these specimens shows that as the soft parts of the fœtus decay and are discharged, the walls of the sac gradually shrink upon and compress the skeleton. An examination of the mass shows that the bones of the arms and legs maintain the folded position assumed by them as the fœtus lies closely girt about by the sac in which it was developed.

When discussing the complications and combinations of tubal pregnancy, it was mentioned that women may conceive in the uterus after having conceived in the tube: that is, a woman may have a lithopædion or the macerated skeleton of a fœtus between the layers of the broad ligament, and yet conceive in her uterus.

Stonham* has demonstrated this in a woman forty-three years of age, who died in the seventh month of pregnancy from bronchitis and ulceration of the trachea. At the *post mortem* examination a fœtus enclosed in thick membrane was discovered in the right broad ligament. Some of the

* *Trans. Path. Soc., London*, vol. xxxviii. p. 445.

bones were completely macerated; the soft structures were soapy in consistence. There was a thin deposit of calcareous material on the inner wall of the cyst. The left broad ligament was normal. *The uterus contained a*

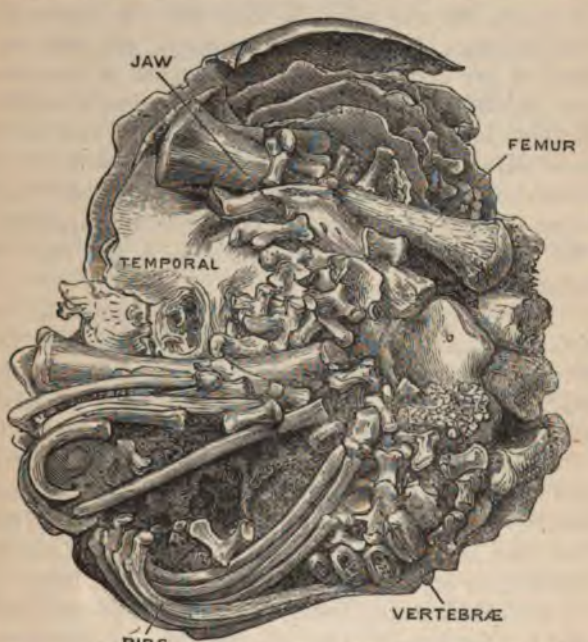

Fig. 109.—Another View of the same Group of Bones sketched in Fig. 108.

seven months' fœtus which was apparently living at the mother's death, since it showed no signs of maceration.

Dr. Worrall,* of Sydney, has published the details of a case in which a woman with a fœtus retained in the broad ligament subsequently conceived in the uterus. The nature of the case was correctly diagnosed, and an

* *Medical Press and Circular*, March 25th, 1891.

operation for the relief of the condition was successfully carried out.

The patient was thirty years of age, and mother of five children. In April, 1888, the menses having been absent six weeks, she was seized in the night with severe abdominal pains, faintness, and vomiting. She was confined to her bed six weeks. In October of the same year, in about the eighth month of gestation, a sudden flooding, unaccompanied by pain, came on, and lasted three days. A month later she was seized with severe abdominal pains, which lasted a fortnight; she then began to decrease in size, and menstruation re-appeared. The tumour decreased to a certain point, and then remained stationary.

After July, 1889, she ceased to menstruate, and her abdomen gradually enlarged. A few months later Dr. Worrall was consulted, and he correctly diagnosed the existence of a living intra-uterine fœtus and an extra-uterine fœtus which had been dead about two years.

Acting on this diagnosis, he removed the extra-uterine fœtus from the left broad ligament. It was not decomposed, but was very flaccid, and weighed 4½ lbs. The placenta was left, and the sac drained. Next day labour came on, and the intra-uterine child was born. It was a female, and cried feebly, "but, in spite of every care, died in a few hours." The patient made a good recovery.

Bozeman* has recorded a case in which uterine supervened on extra-uterine gestation. After delivery of the intra-uterine child an uneven and projecting mass presented in Douglas's fossa. This proved to be the sac of an extra-uterine pregnancy. From the history of the case it had probably been dead between three and four years. The contents of the sac were evacuated through the vagina. The patient recovered.

* *New York Med. Journal*, 1884, vol. xl. p. 693.

CHAPTER XXXV.

TUBAL GESTATION IN THE LOWER MAMMALS.

THE subject of tubal gestation in the lower mammals is somewhat outside the province of this work; it will therefore be very briefly considered. It is, however, important to mention it, because a few of the specimens to be described are useful in throwing light upon some conditions met with in extra-uterine fœtuses in the human subject, and also because it serves to reflect some of the confusion prevailing on the subject of tubal pregnancy generally up to the last five years.

A prolonged and wide search through veterinary literature, and an examination of a few museum specimens supposed to illustrate extra-uterine gestation, has convinced me that *there is no specimen or description of a case of tubal pregnancy in a mammal other than the human female that will bear criticism.* It may be at once pointed out that the mistake is due to the circumstance—especially when the cases are recorded by medical practitioners—that the reporters invariably mistake the elongated uterine cornua for the Fallopian tubes. This is not surprising when we remember that in so many mammals the tubes are rarely thicker than ordinary whip-cord, and, in addition, are usually curled up and partially concealed in the walls of the ovarian sac. With a little care, however, and using the abdominal ostium of the tube as an indicator, no difficulty should be experienced. In the accompanying figure a sketch of the uterus of an ewe with its cornua and tubes shows the general relation of the parts when they are stretched out (Fig. 110).

The conditions usually reported as extra-uterine gestation are due to two causes :—

1. *Abnormal retention of the fœtus in the uterus.*

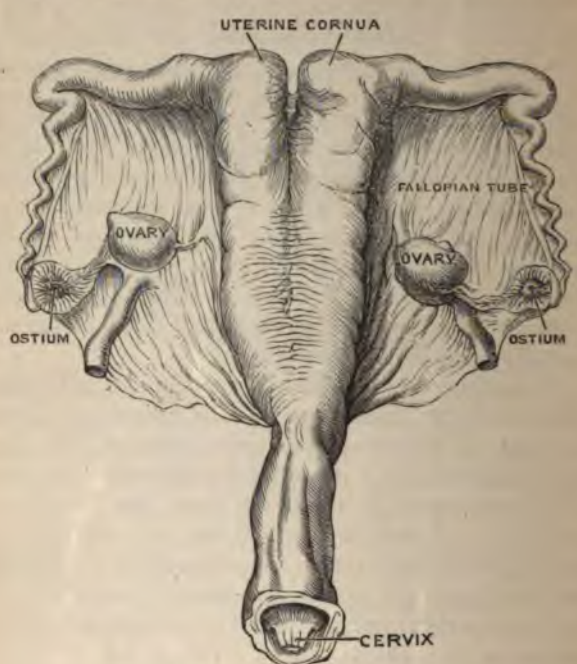

Fig. 110.—Uterus of an Ewe.

2. *Rupture of a gravid uterus or one of its cornua, and retention of the embryo in the peritoneum or sub-peritoneal tissue.*

In domesticated mammals the gestation period for a given species varies within certain limits. Hence : eleven months for a mare, nine months for a cow, five months for ewes and goats, four months for sows, two months

for the bitch and cat, are, like nine months for women, only average periods.

Pregnancy may in cows or mares over-run the average by a few days, two weeks, a month, or even more, and a healthy fœtus be born. With such conditions we are not concerned.

The expression *abnormal retention of a fœtus* is applied to those cases in which an animal goes full term, and then passes through an ineffectual labour; the pains pass away, the abdominal enlargement subsides, and, as a rule, the *rut* fails to appear, the animal remaining permanently sterile.

The Causes of Abnormal Retention are:—

1. *Unusual size of the fœtus.*
2. *Torsion of the uterus or one of the cornua.*

It is well known that when the male is large and out of proportion to the female, the fœtus may be too large to pass through the pelvis. An example of this is sketched in Fig. 111. The drawing represents the pelvis and uterus of a Macaque monkey (*Macacus sinicus*) which died during delivery. When the keeper left the monkey-house in the evening he noticed the animal was restless. On his return next morning he found it dead, with the limbs and trunk of a full-time fœtus protruding. The pelvis was far too small to allow the head to pass out. I presented the specimen to the museum of the Royal College of Surgeons (4,274A).

The fœtus may be retained from unexplained causes. One of the most remarkable instances of this is the specimen presented to the museum of St. Bartholomew's Hospital by Dr. Matthews Duncan. The history of the case is briefly this:—

The Earl of Southesk's famous cow, *Esmeralda*, was served July 7th, 1865. She had rinderpest in December

of the same year, when probably the fœtus died, and the cow recovered. There were no signs of labour during

Fig. 111.—Incomplete Delivery in a Monkey, due to abnormal size of the Fœtus. (Museum, Royal College of Surgeons.)

the rinderpest or at the date when pregnancy should normally terminate. She was regarded as having become sterile, and was fattened for the butcher. In October, 1867, the almost forgotten pregnancy was brought to recollection by the discharge of a mummified calf without anything like the usual manifestation of labour. It

is, of course, possible that the death of the calf was the cause of its retention (Fig. 112).

This case presents an unusual feature, for the rule is

Fig. 112.—Mummified Calf retained in the Uterus eighteen months. (Museum of St. Bartholomew's Hospital.)

that when a fœtus is retained in the uterus from causes other than torsion, it rapidly undergoes putrefaction. In some it becomes converted into adipocere.

The museum of the Royal College of Surgeons contains some specimens illustrating this condition, taken from cows and ewes. One of them is "a portion of the

horn of the uterus of a sheep, containing the head and one of the feet of a lamb, which remained in the uterus beyond the ordinary period of gestation, and became

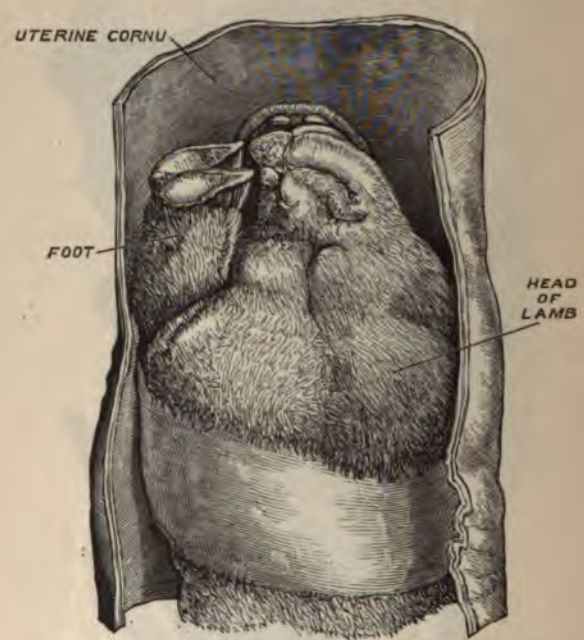

Fig. 113.—Head and one of the Feet of a Lamb retained in the Uterus. (Museum of the Royal College of Surgeons.)

adherent to the surrounding uterine wall" (Fig. 113). Several of these specimens are *Hunterian*.

When a fœtus is retained and air gains access to it, or in consequence of adhesion to the bowels intestinal gases enter the gestation sac, decomposition rapidly ensues, and the soft parts speedily decay and make their

escape, accompanied by putrid and highly offensive discharges, either through the vagina or rectum, or by fistulous tracts in the abdominal wall. Occasionally the bones will come away, but more frequently they are retained, and when the animal dies or is killed, the uterus is found filled with a more or less completely macerated skeleton (Fig. 114).

Axial rotation (twisting or torsion of the gravid uterus) is an interesting accident. It has been most carefully studied in the cow. The whole uterus may rotate, the twists involving the vagina and cervix uteri. The rotation may vary from half a turn to three or more complete revolutions. The directions of the twist may be to the right or to the left.

Complete torsion offers an effectual barrier to delivery, unless help is afforded by art, and this is rarely of much service. The effect upon the cow is often to cause death by hæmorrhage, exhaustion, or rupture of the uterus. In rare cases the cow survives the accident, remains sterile, and the true nature of the case is revealed when the animal is handed over to the butcher. Under such conditions the fœtus is found either as a lithopædion or as a mummy.

When the torsion involves one cornu, it may be so complete as to actually lead to its detachment.

Mr. Hutchinson* reported a specimen of this which he met with in a hare. The abdomen contained a rounded tumour as large as a big orange. The tumour fell out when the belly was opened. On careful dissection, it was found to be a detached cornu of the uterus, containing two fœtal hares. The specimen was submitted to a committee consisting of Dr. Ramsbottom and Mr. Simmonds. These gentlemen furnished a very

* *Trans. Path. Soc.*, vol. v. p. 352 ; 1854.

Fig. 114.—Intra-uterine Maceration of a retained Lamb.

careful report, and at the end appended the following remarks :—

"Three circumstances are especially worthy of remark in this case :—First, there were no signs of putrefaction ; but this is the well-known result of the occlusion of atmospheric air. Secondly, that both fœtuses were lying in one Fallopian tube ; consequently both ovules had been furnished by the same ovary, whereas usually each cornu uteri is impregnated, if, as is commonly the case, there is more than one fœtus. And lastly, that the cyst containing them was quite loose, and not attached to any part of the mother's body. Nevertheless, there must of necessity have existed a connection, and the probability is that the nipple-like projection was the point of communication, and that a forcible separation had taken place—most likely after the animal's death, in consequence of its body having been subjected to rough usage."

It might be argued from this opinion that this was a case of tubal gestation ; but Hutchinson, in describing the specimen, writes :—

"As, in the hare, the uterus itself is but a small pouch in the vaginal extremity of the Fallopian tube, and as gestation is normally carried on partly in the latter, it is idle to dispute the question whether the fœtation was extra-uterine or not. It was evidently *normal*."

It is clear that what Mr. Hutchinson called the Fallopian tube was really the long uterine cornu so natural to hares and rabbits, and was not a case of tubal gestation in the proper sense.

Detachment of the uterine cornua has been reported in the ewe by Simmonds ;* and Fleming† quotes four

* *Veterinary Record*, vol. v. p. 492 ; 1842.

† *Veterinary Obstetrics*, p. 184.

cases described by Ercolani. The specimens—of which the following is a brief description—are preserved in the museum of the Bologna University:—

1. The uterus of a cow, which contained in one of the cornua a fœtus beyond its term, and in the other horn such a quantity of mucus that it would be difficult to decide which was the larger cornu. The uterus is completely divided at the cervix, and floats in the abdominal cavity, being attached only by the broad ligaments, which are thin and distended. The detached portion of the uterus has a globular form, and its perfectly smooth surface is everywhere covered with peritoneum. Where the separation has taken place the organ is closed by cicatricial union of the border of the rupture. The fœtus was contained in the right cornu, and appeared to have lived beyond the ordinary period of gestation, to judge by the hoofs, as well as the teeth which were cut. The fœtus was curled up, and formed a large discoid body.

2. Cornu of the uterus of a pregnant cow, containing a completely-developed fœtus markedly indurated. This cornu, perhaps ruptured during parturition, was detached, and hung almost free in the abdomen, while the rupture has cicatrised, and there is formed a large cyst, everywhere closed, and containing the fœtus. The walls of the uterus are for the most part fibrous, and the fœtal envelopes coriaceous. Like the preceding case, it was found in a cow which had been slaughtered by the butcher. The cornu fell on the ground, after some fibrous bands which attached it to the sub-lumbar region had been cut through.

3. The uterus of sheep arrived at the termination of pregnancy. The organ had been torn in the vicinity of the vagina, and remained free in the abdominal cavity. In this instance, also, the uterus forms a completely

closed cyst, which contains a very much indurated lamb. In detaching this organ an irregular cicatrix was seen, which led to the supposition that the accident was due to torsion of the cervix.

4. Posterior part of the body of a guinea-pig, which shows the right horn of the uterus detached and cicatrised at the point of separation. This horn, which was half free, was filled with fluid blood. The distension caused by the blood has been so great that the horn ruptured in the middle, and the fœtus must have died from hæmorrhage.

The following case of rotation of the uterus occurring in a cat, quoted by Fleming,* is of interest, as it illustrates the changes produced on the uterus by this accident. They are similar to those seen in rotated ovarian cysts:—

"Vivier† had a fine large cat two years old, and just dead, brought to him. A few hours previously it had been apparently quite well. The owner, thinking it had been poisoned, wished a *post mortem* examination to be made. On incising the abdominal parietes he was surprised to find one of the uterine cornua suddenly escape from the opening. This cornu was deeply congested; indeed, it was almost of a violet tint, and the veins were gorged with dark-coloured blood. The other cornu was less voluminous, but offered the same lesions. It was evident the cat was pregnant.

"When the abdomen was completely opened, it was discovered that *the uterus had made two turns upon itself;* the cervix presented the spiral appearance characteristic of torsion; the broad ligaments were intact, and had followed the uterus in its revolution. The two cornua being opened lengthways, they were found to contain a

* *Veterinary Obstetrics.*

† *Archives Vétérinaires*, Sept., 1876, p. 424.

large quantity of black blood, mixed with clots; in this fluid were five fœtuses (three in one cornu and two in the other) contained in their membranes, and probably about fifteen days old."

We have now to consider cases of retained embryos, secondary to rupture of the uterus.

The gravid uterus may be ruptured from traumatic causes; with this we are not concerned. A not infrequent cause is that the fœtus is too large to traverse the maternal passages, and the uterus, in its violent contractions to overcome the obstruction, ruptures, and the fœtus or fœtuses may be discharged into the peritoneal cavity. In such cases the fœtus may be found in the abdominal cavity, whilst the placenta remains in the uterus; in others, the placenta, as well as the fœtus, will be extruded into the peritoneal cavity. After the fœtus escapes, the uterus rapidly contracts, hence a slit, which allows a full-sized fœtus to escape from the uterine cavity, rapidly becomes reduced to an opening of very small dimensions. It is unusual for a case of this sort to give rise to any difficulty in interpreting the course of events; the majority of such accidents terminate fatally. In rare instances the mother survives.

A drawing of the uterus of a jackal, in which the rent occurred on the dorsal wall of the vagina, involving also the cervix of the uterus, is shown in Fig. 115.

Professor Hamilton* has recently recorded a case of extra-uterine gestation in a cat. The following is his description of the specimen:—

"The cat from which I derived the beautiful specimen now in my possession was given to me by Professor Stirling some years ago. He found on killing the animal that the abdomen was occupied by several tumour masses,

* *Journal of Comparative Medicine and Surgery*, April, 1891.

and judging that it was more a pathological subject than one suited for physiological purposes, he sent it over to my laboratory. Being busy at the time, and not recognising the nature of the tumours from the fact of their being so bound up with the abdominal organs, I gave directions to have the viscera cut out and placed in

Fig. 115.—Uterus of a Jackal which ruptured at the junction of Vagina and Cervix. The Fœtuses were free in the peritoneal cavity.

a preservative fluid. To my astonishment, on coming to examine the parts some time afterwards, I found that each tumour was a well-developed kitten lying in the peritoneal sac. I had the whole preparation carefully set up, and as it now stands the description of it is as follows :—

" There are four fully-developed kittens all contained, along with their adjuncta, within the peritoneal cavity. Three of these are amassed in a somewhat pyramidal conglomerate measuring 7 by 6 cm., and arising from the matting together of the parts concerned by dense

fibrous adhesions. The kittens lie close to the middle of the body of the uterus, and are rolled up in a portion of the great omentum, which is closely stretched over the sac in which each is contained. Running through the centre, and so forming the axis of the tumour-like structure, are the uterus and lower part of the intestine. The uterine horns had unfortunately been cut off close to their peripheral extremities, but sufficient of them remain to show that they are free from anything in the shape of a fœtus—indeed, so far as one can judge, they seem to be in their virgin state. The body of the uterus is firmly clasped by the tumour mass, and its channel appears to have become impervious, apparently from the pressure of surrounding parts. Each of the three kittens involved is contained in a single membrane, rough internally, but quite smooth externally. The exact manner of attachment of the placentæ cannot be distinctly traced, owing to the fusion of the component elements.

"The fourth fœtus is entirely detached from the tumour formed by the other three. It has been growing from the lower edge of the great omentum, and appears to be the longest, measuring, as it does, between 12 and 13 cm. from the tip of the nose to the root of the tail. It is coiled up, and, like the others, is enclosed within a single membrane, rough and granular internally, but glabrous on the exterior. The membrane is so tough that it can be readily handled without injury. The placenta is situated upon the interior, or rather seems to form part of this membrane. The area occupied by it is somewhat crescentic, and from end to end measures from $2\frac{1}{2}$ to 3 cm. From it comes off what looks like a bunch of fibrous cords, but on closer inspection each of these proves to be an umbilical vessel. Nearer the fœtus they are twisted into a rope-like texture, which makes a couple of coils round the right hind limb, immediately above the

foot. They afterwards penetrate the abdomen in the usual situation, the abdominal wall being perfectly closed.

"The omental basis to which the placenta is attached is constituted by a few of the islands of fat naturally present within the membrane. The loose omental trabecular tissue for some distance above this has become adherent to and bound up with these particles of fat so as to constitute a solid stump, to the free extremity of which the placenta is united.

"There is an entire absence of anything like recent peritonitis, and the only evidence of its having existed formerly is in the localised adhesions whereby the three first described fœtuses are lashed together and to the body of the uterus. The nutrition of the mother, like that of the offspring, was excellent."

In describing this case Professor Hamilton makes remarks on the subject of extra-uterine gestation in general, and comes to the conclusion that "the only explanation admissible under these circumstances is that the fecundated ova fell either from the ovary directly, or from the end of the tube into the abdominal cavity, and took root upon the parts of the peritoneum with which they came in contact."

The description of the specimen is, however, against this explanation, but indicates that during pregnancy rupture of the uterus occurred, allowing the kittens to be extruded into the peritoneal cavity; as this is an air-tight chamber, and the kittens formed no intimate connections with the intestine, they were converted into the conglomerate masses described by Professor Hamilton. The precise condition of the vagina and adjacent parts of the uterus could not be ascertained, because "the uterine horns had unfortunately been cut off close to their peripheral extremities." Another significant sentence is this:—"The body of the uterus is firmly clasped by the

tumour mass, and its channel appears to have become impervious, apparently from the pressure of the surrounding parts." It is not beyond the bounds of probability that this "impervious" part represents the situation of the original rent in the uterus through which the kittens were ejected.

Professor Hamilton writes:—"It seems one of the most extraordinary phenomena in nature that the wall of a serous cavity should thus assume functions entirely foreign to it." I would add: *There is no reasonable evidence to lead us to believe that such an event occurs either in women or in other female mammals.*

In concluding this chapter let me add that there is no accurate or trustworthy description of a case of *tubal gestation* in any animal, save the human female, on record. That this form of gestation occurs I have no doubt, but it awaits demonstration.

CHAPTER XXXVI.

THE DIAGNOSIS OF TUBAL PREGNANCY.

It is necessary in a work of this kind to devote some space to the consideration of what is called **pelvic hæmatocele** before discussing the diagnosis of tubal pregnancy in detail.

In its general sense the expression is used to signify a collection of blood in the recto-vaginal pouch of peritoneum, or between the layers of the mesometrium. Blood extravasated in any quantity into the peritoneal cavity would naturally find its way into this fossa. There is therefore good reason for adopting the suggestion of Lawson Tait, "that the phrase *pelvic hæmatocele* ought to be retained to cover all effusions of blood which have their origin in the pelvis."

Pelvic hæmatoceles are of two kinds: the blood may be effused direct into the peritoneal cavity, or into the connective tissue between the layers of the mesometrium. The first variety should be called **intra-peritoneal hæmatocele,** and the second **hæmatoma** of the broad ligament.

The first systematic account of this important condition was published by Bernutz and Goupil, and their admirable work has formed the basis of our knowledge of the pathology of pelvic hæmatocele.

Bernutz and Goupil arranged the causes of these pelvic extravasations under five headings:—

1. Rupture of utero-tubar varices.

2. Bloody exhalations from the pelvic peritoneum.
3. Rupture of the Fallopian tube.
4. Difficult menstrual secretion.
5. From metrorrhagia.

A study of the various cases quoted in support of this classification does not satisfy me that it is sound. The most important section of the work is that which deals with pelvic hæmatoceles occurring in extra-uterine pregnancies, and is entirely the work of Goupil. Hæmorrhage arising in the course of *tubal gestation* he arranges under five causes, and suggests a sixth, but does not actually adopt it.

They are :—

1. Rupture of a dilated utero-ovarian vein.
2. Rupture of the ovary.
3. Rupture of the tube.
4. Rupture of the cyst.
5. Hæmorrhage within the cyst.

The sixth cause suggested is simple hæmorrhage from the Fallopian tube.

For many years after the publication of Bernutz and Goupil's observations our knowledge of the pathology of pelvic hæmatocele received but little addition. Its clinical importance could not well be overlooked, and text-books dealing with diseases of women have, since that date, devoted space to its consideration.

One of the most important facts that have of late years been demonstrated in connection with pelvic hæmatocele is that nearly all the extravasations of blood which occur in the recto-vaginal fossa (Douglas's) or between the layers of the broad ligaments are due to rupture of a pregnant tube. For the simplification of our knowledge in this direction we are largely indebted to Lawson Tait.

On becoming acquainted with his views, it seemed to

me that Tait put the matter too strongly, and in a short paper communicated to the Medico-Chirurgical Society I urged that "specimens of intra-peritoneal hæmatocele, as they are called, have been recorded and shown at societies as examples of ruptured tubal pregnancies, but no embryo or membranes were found. I am strongly of opinion that no case should be regarded as due to ruptured tubal pregnancy unless membranes or fœtus, or both, are forthcoming, however suggestive the clinical evidence."

Since that paper was written, not only have I come to the opinion that Tait is right in insisting that most pelvic hæmatoceles are secondary to tubal pregnancy, but my observations, that many impregnated ova which escape from the tube, either by *rupture* or *abortion*, are in the condition of moles, have furnished additional means of recognising the nature of the case.

Returning to the classification of Bernutz and Goupil, we may at once dispose of groups 2 and 4, "bloody exhalations from the pelvic peritoneum," and "difficult menstrual secretion," as meaningless; group 3, or "hæmorrhage from rupture of the Fallopian tube," is covered by the second section, or hæmatoceles secondary to extra-uterine pregnancy; group 1, "Rupture of utero-tubar varices," and group 5, "hæmatocele from metrorrhagia," are causes believed in by most obstetricians. Intra-peritoneal hæmatocele or a hæmatoma from such a cause must be very rare, and opportunities for dissecting such cases have never occurred to me. To these we must add hæmorrhage into the broad ligament after removal of a cyst from between its layers, or into the peritoneum from the slipping of an ill-applied ligature after operations on the pelvic viscera.

With regard to hæmatoceles secondary to extra-uterine gestation, we may arrange them under two

headings, instead of the five or six adopted by Bernutz and Goupil. The classification would be as follows :—

1. Rupture of blood-vessels lying between the layers of the broad ligament.
2. Hæmorrhage secondary to surgical procedures on the ovary or tubes.
3. Regurgitation from the uterus into the tubes.
4. Rupture of a gravid Fallopian tube.
5. Tubal abortion.

It is with the last two of this series that we are concerned.

The **symptoms of tubal gestation** vary considerably according to the degree to which gestation has advanced ; it will therefore be necessary to deal with it in the following stages :—

1. Before primary rupture or abortion.
2. At the time of primary rupture or abortion.
3. From the date of primary rupture to term.
4. After term.

Before proceeding to discuss the signs which occur during each of these stages, it will be necessary to point out that the patient is sometimes aware that she is pregnant ; in very many cases she is not aware of the fact, and the practitioner is often deceived by the absence of the usual signs of gestation, viz. fulness of the breasts and amenorrhœa. The breast signs are very variable in tubal gestation ; in many cases they are absent even when the pregnancy has gone on to the fifth month ; in others the signs of pregnancy are as clear and as marked as in normal gestation. In one of my cases milk was present in one breast only, and that was on the same side as the gravid tube. Speaking generally, the absence of the usual signs of pregnancy do not negative the existence of tubal gestation ; on the other hand, their presence is valuable, and may lead to a correct diagnosis.

Before primary rupture.—Gravid tubes have in a few instances been removed before *primary* rupture or *abortion*, but in nearly all the recorded instances the operation was undertaken for the purpose of removing diseased tubes; examination of the parts after removal has revealed the fact that they were gravid.

Dr. Herman in one undoubted case diagnosed the existence of tubal pregnancy before rupture, and his diagnosis was completely confirmed at the operation. The case was interesting, as he had previously operated on the patient for tubal gestation. The details of this important case are given on page 367.

Primary rupture.—In tubal gestation the sac *ruptures* or *abortion* occurs, if the pregnancy progresses, at some period before the twelfth week; the effect upon the patient depends on the seat of rupture. When the rupture takes place between the layers of the broad ligament, the symptoms will, as a rule, be less severe than when the tube bursts into the peritoneum, because the pressure exercised by the blood extravasated into the tissues of the broad ligament tends to check hæmorrhage, whereas the peritoneum will hold all the blood the patient possesses, and yet produce no hæmostatic effect in the form of pressure.

The signs of intra-peritoneal rupture are those characteristic of internal hæmorrhage. The patient complains of "a sudden feeling as if something had given way," and this is followed by general pallor, faintness, sighing respiration, depression of temperature, rapid and feeble pulse, usually vomiting and in some cases death ensues in a few hours.

Should the patient recover from the shock, she will often state that she suspected herself to be pregnant. The symptoms of rupture are often accompanied by hæmorrhage from the vagina, and shreds of decidua will

be passed, so that the case resembles in many points, and is sometimes mistaken for, early abortion.

The rapidity with which the rupture of a gravid tube will sometimes destroy life has caused more than one writer to describe this accident "as one of the most dreadful calamities to which women can be subjected"; indeed, it is so rapidly fatal in some instances that more than one case is on record in which death has been attributed to poisoning, until dissection, instituted in many instances by the coroner, has revealed the true cause of death. It will be useful to illustrate this by briefly describing a few cases.

In 1882 Mr. Daly exhibited to the Obstetrical Society, London, a specimen of extra-uterine gestation. The patient, who believed herself to be two months pregnant, was seized immediately after dining with violent pain in the abdomen, became blanched in the face, covered with cold sweat, and passed into a state of collapse, from which she scarcely rallied, and died on the fourth day. At the *post mortem* examination the tubal gestation sac was found on the right side, this had ruptured and two pints of blood were found in the abdomen. There was no trace of peritonitis.

In the discussion that followed the reading of this case, Dr. Chahbazian* mentioned the case of an English actress who died in Paris in the following circumstances:—She was taking an ice in a *café* of the Bois de Boulogne, when suddenly she fell down dead. Poisoning being suspected, her corpse was sent to the *Morgue*, and at the necropsy he examined the stomach and the digestive organs for poison. No trace of poison was found, but incidentally he discovered, with those who assisted him, the sac of an extra-uterine fœtation which had ruptured.

* *Trans. Obstet. Society, London*, vol. xxiv. p. 157.

It is rarely they die so quickly as in the case just mentioned. The following case was unusually rapid.

A married woman, the mother of several children, believed herself to be in good health and had no suspicion of pregnancy, ate a large quantity of mussels for supper, and retired to bed. In the course of the night she vomited, and whilst vomiting was suddenly seized with severe and violent pain in the abdomen. Dr. Clegg, of Stratford, was summoned; from the history of the case, and the collapsed condition of the patient, he suspected she had been poisoned. In twelve hours the patient died. Dr. Clegg, on a coroner's warrant, made a *post mortem* examination, and found a gravid Fallopian tube. The embryo corresponded to the eighth week of gestation. The sac had ruptured in two places, the blood escaping in large quantity into the peritoneal cavity. The specimen is preserved in the museum of the London Hospital, and a drawing of the parts is given in Fig. 116.

From an analysis of many careful and accurate records of this accident, it would seem that the most rapidly fatal cases are those in which the ovum is lodged in the uterine section of the tube—tubo-uterine gestation. Death may ensue in a few hours.

A striking example of this was recorded by Mr. C. H. Roper:—*

A woman thirty-two years of age, the mother of two children, was suddenly seized whilst in bed with severe abdominal pain, followed by diarrhœa and vomiting. The doctor was summoned, and he found the patient's skin cool and moist, the respiration and temperature normal, and the pulse good. Ten hours later she was in a condition of collapse, and twelve hours after the onset of the symptoms she died. At the *post mortem*

* *Trans. Obstet. Soc.*, vol. xxiv. p. 227.

examination the abdominal cavity was found to contain a large quantity of blood-clot and bloody fluid. Floating

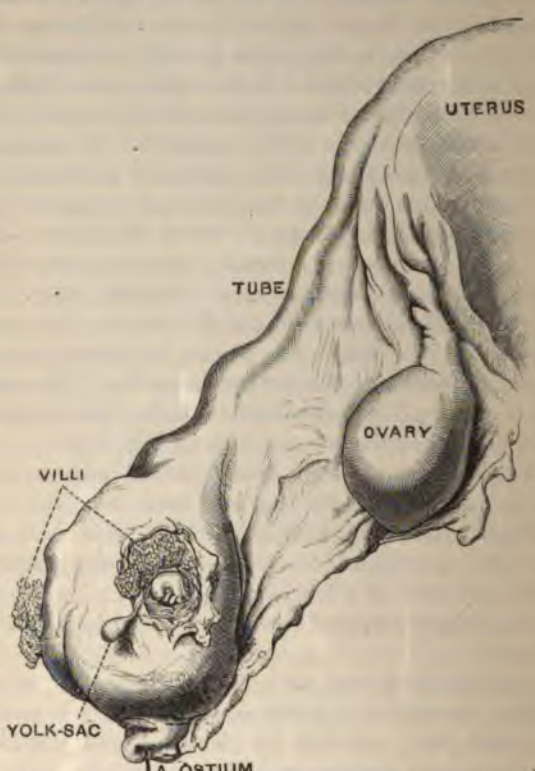

Fig. 116.—Gravid Fallopian Tube, which ruptured and caused death in twelve hours. (Museum of the London Hospital.)

in this was an embryo, corresponding to the second month of development, enveloped in its membranes. At the upper part of the uterus a rupture was detected large enough to admit three fingers.

This specimen was dissected subsequently by Mr. Alban Doran, and found to be an example of tubo-uterine gestation (Fig. 104).

Fortunately, death is not always so sudden, even when the rupture is intra-peritoneal, as the following cases prove :—

A woman thirty-seven years of age came under my care in the Middlesex Hospital. She had been twice married. Her matrimonial life extended over seventeen years, and she had never been pregnant. Five weeks before admission, patient was seized with sudden violent pain in the abdomen. Dr. Clegg, of Stratford, was sent for and, on arriving, found the woman collapsed. Slowly she re-acted, and refused to allow any vaginal examination to be made. In the course of a few days a swelling appeared on the right side of the abdomen. At the end of five weeks she was sent to me at the Middlesex Hospital.

On admission I found a swelling occupying the right iliac fossa, extending upwards to the costal arch, and inwards as far as the middle line. The uterus was normal in position, and the sound entered three inches. The right side of the recto-vaginal pouch was occupied by an ill-defined swelling, firm to the touch ; a rounded movable nodule, of the bigness of a Tangerine orange, lay behind the uterus. No breast signs or history of vomiting. There was great tenderness over the abdominal aspect of the tumour. During the next twelve days the temperature ranged from 99° in the morning to 101° in the evening.

On September 6th (twelve days after admission) I opened the abdomen, and came upon a quantity of putrid, dark-coloured blood-clot filling the pelvis and right iliac fossa, and extending upwards to the liver. A gestation sac was found in the right Fallopian tube ; an

apoplectic ovum, and the head of an embryo of about the eighth week among the blood-clot.

In this case the patient had survived an intra-peritoneal rupture nearly seven weeks. She recovered from the operation.* The amount of blood extravasated in this case was very great, and extended from the pelvis along the right side of the abdomen to the liver. The parts removed in this case are sketched in Fig. 95.

The museum of St. George's Hospital contains a specimen the history of which is exceedingly instructive. It is the uterus, Fallopian tubes, and broad ligaments. The left Fallopian tube is distended near its uterine end, and contains an early embryo. The gestation sac had ruptured on its posterior aspect and blood-clot projects from the opening. The uterus is enlarged, and its cavity contains a ragged decidua (Fig. 117).

The patient was thirty-five years of age; she had had twelve children: the last in 1883. She was in good health on August 16th, 1886, when she started from Cowes (Isle of Wight) for London. She was suddenly seized whilst in the train with acute abdominal pain and vomiting. On August 18th she was admitted into St. George's Hospital in a state of collapse: the urine had been suppressed for twenty hours; the belly was tense and tender. She died nine hours after admission.

It is worth noticing that in many cases the acute signs of rupture occur soon after the patient retires to bed. It has often suggested itself to me that in some of these cases the determining cause was probably *sexual congress*. In the case briefly described on page 310 the symptoms set in immediately after this act was vigorously indulged in subsequent to a long abstinence.

It is not difficult to prove that a pregnant Fallopian

* *Medico-Chir. Transactions*, vol. lxxiii. p. 55.

tube may rupture into the peritoneal cavity, and the hæmorrhage be so small as to give rise to only slight symptoms. In August, 1886, I removed by abdominal

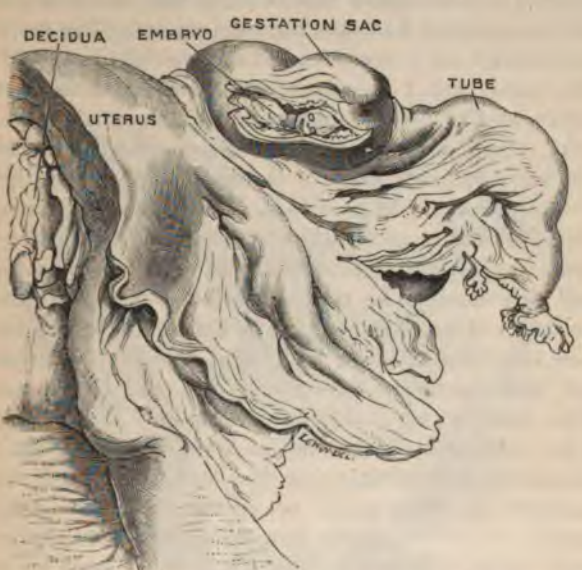

Fig. 117.—Gravid Tube. The gestation sac ruptured, and caused death in about forty-eight hours. (Museum, St. George's Hospital.)

section the tubes and ovaries from a woman aged twenty-five years. She had been treated for many weeks by rest and medicine for what was supposed to be chronic inflammation of the Fallopian tubes, and a hard rounded swelling was easily detected on the left side of the uterus. The symptoms had come on insidiously; there had never been any sudden pain or arrest of menstruation. On drawing up the left uterine appendages, they were found adherent to a large fold of omentum, containing

blood-clot and an ounce of fluid blood. The omentum, tube, and ovary, with the adjacent portion of the mesometrium, were removed. The ovary contained some enlarged follicles, and it was thought that one of these had ruptured and furnished the hæmorrhage. The specimen puzzled me at the time, and was carefully preserved. Two years later I re-examined the parts, and found a rupture in the Fallopian tube, near the abdominal ostium. Lying snugly in the fold of omentum adherent to the tube was a rounded mass of laminated clot, and in this a tubal mole as big as a cob-nut. One part of its circumference looked ragged, and on teasing some of the fragments in glycerine, and examining them microscopically, they were found to be typical chorioni villi. The parts are shown of nearly natural size in Fig. 118. It then became clear that the tube had been gravid. The ovum had been converted into a mole followed by rupture of the gestation sac at about the third week. The date of the rupture could not be fixed with certainty, but I knew from physical signs that this clot had occupied the omentum for many weeks before the operation. The fact that this mole and the surrounding clot were, for so many weeks, tolerated by the peritoneum assists us in comprehending that when an apoplectic ovum is discharged from the Fallopian tube and lodged between the layers of the mesometrium, it becomes sequestrated, and in many cases causes no further trouble.

In **tubal abortion** and **primary extra-peritoneal rupture** the symptoms are not so urgent, and may be misleading.

Our knowledge of the leading symptoms of tubal abortion is very limited. The following are the chief points in the clinical history of the first case which came under my notice :—

Mrs. N——, aged 26 years, married, and mother of

two children, the youngest being six years of age. One morning, whilst engaged with her domestic duties, she was suddenly seized with severe abdominal pain, accompanied by a discharge of blood from the uterus. The catamenia had been perfectly regular for four years, and

Fig. 118.—Gravid Fallopian Tube which has ruptured. The apoplectic ovum was caught and sequestrated in a fold of omentum.

there was not the slightest suspicion of pregnancy. There was no swelling of the abdomen; the left breast contained milk; there was no difficulty with the bladder or urine. On examination through the vagina a rounded mobile tumour could be made out on the right side, and a smaller but less defined and very tender swelling on the left. Three days later the patient was examined under chloroform, and a consultation hel[illegible]ase. In

consequence of the manipulations the patient's temperature rose during the next twenty-four hours to 103°, the pulse was rapid and feeble, and she complained of great pain. The abdomen was then opened, and the intestines were found floating in blood. The abdominal ostium of the left tube was widely open; the tube contained blood-clot and a small body that was afterwards proved to be an early apoplectic ovum (*see* page 328 and Plate V.). The tumour on the right side proved to be an oöphoritic cyst.

In **extra-peritoneal rupture**—that is, when the tube bursts so that the blood is extravasated between the layers of the broad ligament—the symptoms resemble intra-peritoneal rupture, but as a rule are not so severe, and the signs of shock pass off quicker. On examining by the vagina, a rounded ill-defined swelling occupies one or other broad ligament; when the effused blood is large in amount the uterus will be pushed to the opposite side. When the bleeding takes place into the left broad ligament it will sometimes extend backwards under the peritoneum, and invade the connective tissue around the rectum, so that when the exploring finger is introduced into the rectum, a semicircle, sometimes a ring, of swollen tissue will be felt encircling the gut.

The escape of decidual membrane from the uterus accompanied by blood is also an important and fairly constant sign. Occasionally it will be necessary to pass a sound into the uterus; the cavity of this organ will be found slightly enlarged when the tube is gravid and the os is invariably patulous.

The greatest difficulty in these cases is to be sure that the rupture is purely extra-peritoneal. In a few cases the rupture may also involve the peritoneal as well as the uncovered portion of the tube. In one of my cases the bleeding was at first extra-peritoneal, but the broad

ligament became so rapidly distended that the blood burst through into the peritoneum.

Not infrequently after primary extra-peritoneal rupture the symptoms of shock pass off, and the embryo continues its development; in many instances in which the patients believe themselves pregnant, the hæmorrhages from which they suffer and the signs indicative of the primary rupture may merely cause temporary inconvenience. As the embryo grows the abdomen increases in size, but the enlargement differs from ordinary uterine gestation in that it is lateral instead of median.

From the third month onwards the **leading signs of tubal gestation** may be summarised thus:—

(1) *Amenorrhœa* is occasionally found; frequently there is hæmorrhage from the uterus, occurring at irregular intervals, accompanied by the escape of decidual membrane. This last is a valuable diagnostic sign. It is even more valuable if the patient has missed one or two periods.

(2) There may or may not be milk in the breasts. Its presence is a valuable indication. From its absence nothing can be inferred.

(3) The uterus is slightly enlarged; the os is usually soft, as in normal pregnancy, and patulous.

(4) A large and gradually increasing swelling to one side and behind the uterus. Occasionally the fœtal heart can be heard, and in advanced cases the outlines of the fœtus may be distinguished.

(5) When a woman in whom the existence of tubal gestation is suspected is suddenly seized with collapse, and all the signs of internal bleeding, it is indicative of rupture of the gestation sac.

(6) Tubal pregnancy is very apt to occur after long intervals of sterility.

In spite of all the risks that beset the life of an extra-uterine child and that of its mother, the pregnancy

may go to term. Then a remarkable series of events ensues.

(*a*) Paroxysmal abdominal pains come on, resembling those of natural labour, accompanied by a discharge of blood and mucus from the uterus resembling the "show," and the os uteri dilates.

(*b*) This unavailing labour may last a few hours or days (it is stated to have lasted for weeks in some patients), and then subside.

(*c*) The mammæ may continue to secrete milk for several weeks.

These signs sometimes pass away, the liquor amnii is absorbed, the swelling diminishes in size, and the retained fœtus causes no trouble. In the majority of cases suppuration takes place in the sac, the fœtus decomposes, and fragments of its tissues are discharged through sinuses in the groin, abdomen, vagina, rectum, or bladder. It should be remembered that the onset of labour may rupture the sac.

The diagnosis of tubal gestation is often extremely simple, but in many cases it is surrounded by many difficulties. The conditions with which it is most frequently confounded may be briefly mentioned, with reference to reported cases.

1. *Uterine gestation.*—In 1891 Dr. Griffith* communicated to the Obstetrical Society details of a case in which a pregnant woman came under his care; she was supposed to have twins, one intra- and the other extra-uterine. It ultimately turned out that the patient was pregnant, and what was supposed to be the head of an extra-uterine child was a large fibroma of the ovary, obstructing labour.

2. *Tubal gestation in the broad ligament stage may be mistaken for an ovarian cyst.* Doran† mentioned a case

* *Trans. Obstet. Soc., London*, vol. xxxiii. p. 140.
† *Ibid.*, vol. xxxiii. p. 156.

of this kind in which no operative treatment was carried out; at the *post mortem* examination the true nature of the case was ascertained.

Extra-uterine gestation in the broad ligament stage has been several times mistaken for a *gangrenous myoma* or *sarcoma*, even when the parts have been exposed by abdominal section. This is a serious error, as the operator, instead of opening the sac, attempts to remove the tumour, usually with a fatal result.

An *ovarian cyst may be present as well as a gravid tube.** I once operated on a case in which the left tube was gravid, and an ovarian cyst existed on the right side.

A *retroverted gravid uterus* has been a source of error. Retention of urine, so characteristic of this condition, is occasionally produced when the embryo occupies the broad ligament, accompanied by much hæmorrhage. On the other hand, *extra-uterine gestation* has been mistaken for retroversion of a gravid uterus. Dr. Godson† relates a case which occurred in a woman who had been married thirteen years. A year after marriage she had one child. She remained sterile for twelve years, and then became pregnant. On account of inability to pass, she was admitted into St. Bartholomew's Hospital, and an ineffectual attempt made to replace what was supposed to be a retroverted uterus. She was subsequently discharged. Eventually Dr. Carter removed an *extra-uterine* fœtus by abdominal section.

Gestation in one horn of a bicornuate uterus should be remembered.—The relation of cornual to tubal pregnancy is so important that the chief facts concerning this condition are related in chapter xxxii.

* *Trans. Obstet. Soc., London*, vol. xxxii. p. 342. See also Edis, *Journ. of the Brit. Gyn. Soc.*, vol. v. p. 57.

† *Proc. Med. Soc., London*, vol. vii. p. 390.

The early stages of tubal gestation are most likely to be confounded with *hydro-* and *pyo-salpinx, small ovarian cysts*, and *pelvic cellulitis*.

At the time of rupture the symptoms may mimic many conditions, such as intussusception and other forms of intestinal obstruction, perforation of the stomach or intestines, rupture of an aneurism, acute axial rotation of an ovarian cyst, abortion, even renal or biliary colic. To give details of cases illustrative of these errors would be tedious, but such have been repeatedly made.

Sinclair Stevenson* reported a case of *spurious pregnancy simulating ectopic gestation of the fourth month*, in which there was amenorrhœa. So strongly marked were the signs of tubal pregnancy that the abdomen was opened; instead of pregnancy, a small cyst of the ovary was found.

It is well known that in several instances the abdomen has been opened under the impression that the patients were suffering from tubal pregnancy, but nothing abnormal was found. *Normal pregnancy* has been mistaken for extra-uterine gestation; the abdomen was opened, the fœtus extracted, and the uterus excised before the error was discovered.

In very many instances abdominal section has been undertaken to remove supposed ovarian tumours, dilated tubes, and the like, but the supposed tumours have turned out to be gestation sacs. This is no reflection on the surgeon, and more than justifies the interference. When a surgeon opens the abdomen to remove a tumour supposed to exist within, and finds nothing abnormal, it recalls the following sentences relating to phantom tumour, expressed in Matthew Duncan's† characteristic style:—

* *Trans. Obstet. Soc., London*, vol. xxxii. p. 216.

† *Perimetritis and Parametritis*, p. 58.

"These cases are improperly described as tumours of any kind. There is only fulness of the abdomen. The whole disease is generally quite as much a phantom of the brain of the patient and of the physician as a tumour, of whatever designation, of the belly."

Uterine myomata and broad ligament tumours simulate extra-uterine gestation.

Skene Keith* has briefly mentioned a case in which his father performed abdominal section, expecting to find a "fibroid tumour," but on cutting into it, a fœtus, which had been dead nearly two years, was found.

Thornton and others have dissected out the sac, under the belief that they were dealing with tumours.

On the other hand, operations have been undertaken under the impression that the patients were victims to advanced extra-uterine pregnancy, but tumours have been found instead.†

Dr. John Williams‡ writes: "I once saw a swelling which appeared to be a small ovarian cyst aspirated; it proved afterwards to be the placenta in a case of extra-uterine gestation."

* *Obstet. Trans., Edin.*, vol. x. p. 92.

† Meadows has recorded a striking instance of this: *Trans. Obstet. Soc., London*, vol. xv. p. 145.

‡ *Ibid.*, vol. xxix. p. 490.

CHAPTER XXXVII.

THE TREATMENT OF TUBAL GESTATION.

THE admirable results which have followed the treatment of tubal pregnancy by abdominal section have served to establish this method on as secure a footing as ovariotomy.

Methods formerly advocated, such as killing the fœtus by injecting drugs into its body, or, more recently, by electricity and similar unsurgical procedures, are of such an unsatisfactory character that they will not be considered.

The risks and difficulties of an operation for tubal pregnancy depend mainly upon the extent to which gestation has advanced at the time the operation is performed. The operative treatment may be considered in the following stages :—

1. Before primary rupture or abortion.
2. At the time of primary rupture.
3. Subsequent to rupture.
4. When the embryo and placenta have occupied the broad ligament.

This fourth stage will require to be considered in sections, thus :—

(*a*) At or near term ; the child being alive.

(*b*) At, near, or after term ; the child being *dead*, *mummified*, or in the condition of a *lithopædion*.

(*c*) After decomposition of the fœtus and suppuration in the sac.

1. **Before primary rupture or abortion.**—Opportunities of removing a gravid tube before rupture are extremely rare, and in most of the cases in which it has been carried out the nature of the tubal mischief has not been appreciated. Such cases have been usually classed as *hæmatosalpinx*.

Herman's case, in which he diagnosed tubal pregnancy and operated before rupture had taken place, is as yet without parallel.

2. **At the time of primary rupture or abortion.**—The major ty of cases of tubal pregnancy come under observation at the time of primary rupture or abortion, and this is usually some period between the fourth and twelfth week.

When the symptoms of hæmorrhage are unmistakable and the patient's life in grave danger, abdominal section should be performed without delay, unless there is good evidence that the rupture is extra-peritoneal. The employment of this method is in strict accordance with the canon of surgery valid in other regions of the body: viz. arrest hæmorrhage at the earliest possible moment.

There are few accidents that test the skill, nerve, and resources of a surgeon more than an abdominal section for a suspected intra-peritoneal rupture of a gravid tube, and few operations are followed by such brilliant results.

The method of performing the operation before and at the time of primary rupture is identical with oöphorectomy.

Occasionally the rent in the tube will involve the fundus of the uterus, especially when the ovum is lodged near the uterus. Such rents should be carefully sutured with gut.

3. **Subsequent to primary rupture.**—The majority of cases are submitted to operation at periods

varying from a few days to weeks, or even months, after the tube has ruptured. It has been already pointed out that in an exceedingly large proportion of cases the ovum in the tube becomes "apoplectic," and this condition is associated with death of the embryo.

When the tube ruptures the hæmorrhage may not be so profuse as to induce death, and the patient, recovering from the shock, does not manifest such grave symptoms as to induce the medical attendant to resort to surgical aid. The consequence is that the patient remains for several weeks under palliative treatment (unless a renewal of bleeding kills her), and at last surgical advice is sought, the true nature of the case appreciated, and abdominal section is performed.

In such cases, when the abdomen is opened the free blood in the peritoneal cavity is washed out by a stream of warm water, as directed in chapter xl. The damaged tube and ovary are removed as in oöphorectomy. When much free blood exists in the peritoneal cavity, care must be taken that no clots are allowed to remain in the iliac fossæ. When blood has remained in the peritoneal cavity for several weeks after rupture, it is invariably necessary to drain.

4. **Broad ligament gestation.**—When the rupture takes place so that the blood is extravasated between the layers of the broad ligament and the ovum is "apoplectic," operative interference is rarely called for. In a small proportion of cases the embryo survives the displacement, and continues to grow.

At any date from this period up to term, surgical interference may be called for to save the patient from the disastrous effects of secondary rupture into the peritoneal cavity.

When gestation has not advanced beyond the fourth month, it is possible to remove the embryo, tube, ovary,

and adjacent portion of the broad ligament with the placenta, and to thoroughly remove all blood-clot. Then, by transfixing the broad ligament and tying the parts with silk ligatures, the cavity may be completely obliterated, and the ovary, with that portion of the tube on the distal side of the ligature, cut away.

When gestation has advanced beyond the fourth month the placenta has become too large to be dealt with in this summary manner; at the same time, the sac has encroached upon the peritoneum belonging to adjacent organs, such as uterus and rectum, bladder, and not infrequently the anterior wall of the abdomen.

After the fifth month operative measures for tubal gestation must be considered under two headings:—(1) The treatment of the sac; (2) The treatment of the placenta.

The treatment of the sac.—The gestation sac in the last stages of tubal pregnancy consists of the remnants of the expanded tube and the broad ligaments, which may be thickened in some parts and expanded in others. To the walls of the sac coils of intestine and omentum usually adhere.

The removal of such a sac is fraught with considerable risk not only to the adjacent large blood-vessels, but to the viscera and ureters. Nevertheless, in spite of the great risk of such a proceeding, it has on one occasion been successfully accomplished, and the patient luckily recovered.* It will generally be found that in cases where attempts have been made to dissect out the sac, the operation was begun under the impression that the abnormal mass was a tumour.† The only instance in which I have seen an attempt made in this direction,

* Thornton: *Trans. Obstet. Soc.*, vol. xxiv. p. 81.
† Doran: *Ibid.*, vol. xxix. p. 491.

an obstetric physician thought that he had to deal with a sloughing uterine myoma. He succeeded in removing the mass, and on examining it after the operation, found it to be a gestation sac. The patient died immediately after the operation.

Experience has decided clearly enough that the safest plan is to incise the sac, remove the fœtus, and stitch the edges of the sac to the abdominal wound, precisely as in the plan recommended after enucleating large cysts and tumours from between the layers of the broad ligament.

In those cases where the gestation has well advanced, the peritoneum may be so removed from the anterior abdominal wall that the sac can be penetrated without intentionally opening the peritoneal cavity at any stage of the operation.

The step which perplexes the operator is how to deal with the placenta. There can be no doubt that the situation of the placenta largely influences the result, and as far as I can judge from the reports of cases, as well as from many operations I have witnessed, the most promising cases are those in which the placenta is situated in the pelvis, below the fœtus.

When the placenta is situated above the fœtus it will, in many cases, be incised as the sac is opened, and give rise to such furious bleeding that in several cases the patient has succumbed to the hæmorrhage. Even prompt seizure and ligature of the broad ligament on the uterine side of the sac fail to arrest the bleeding; in such a case the abdominal aorta must be compressed.

Various methods, such as packing with sponges and the application of perchloride or persulphate of iron to the bleeding surfaces, have been adopted, and in a few instances with success.

The fear of such hæmorrhage and its uncontrollable

character have induced several surgeons to adopt the alternate plan of leaving the placenta, and allowing it to gradually slough away, taking care, of course, to keep up a free communication with the exterior. The disadvantages of this method are many. The process of suppuration and discharge of the placenta is long and dangerous, on account of the great risk the patient runs of septicæmia and peritonitis; in a large proportion of cases a fæcal fistula forms; in the majority of cases, however, such fistulæ gradually close as the patient convalesces.

In order to avoid this risk, attempts have been made, after removing the fœtus, to thoroughly irrigate the gestation sac, tie the cord close to the placenta without disturbing the latter, cautiously sponging the cavity and then hermetically closing it, in the hope that the placenta will atrophy.

Unfortunately for this method, there is another source of infection to reckon with. It has already been mentioned that as the gestation sac enlarges it frequently strips the peritoneum from the rectum, and the placenta itself may acquire adhesions to the bowels. The result is that intestinal gases gain access to the placenta, and set up decomposition.

With our present experience, the rules for the treatment of the placenta may be formulated thus:—

1. When the placenta is situated above the fœtus it is good practice to attempt its removal with the fœtus.
2. In some instances the placenta becomes detached in the course of the operation, and leaves no choice.
3. When the placenta is below the fœtus, it may be left.
4. Should the placenta be left, the sac cl
   symptoms of suppuration occur, then t
   must be re-opened and the placenta r

5. If the fœtus dies before the operation is attempted, the placenta can be removed without risk of hæmorrhage.

Could we feel sure that the placenta would not decompose, the best method would be to hermetically close the sac, and wait until we know that the placental circulation had ceased, then re-open the sac and take out the placenta. Unfortunately, we have no precise data to guide us in this respect, and whilst waiting for the placental circulation to cease, the placenta decomposes.

The great risk of violent hæmorrhage from the placental site renders an operation for tubal pregnancy between the fifth and ninth months of gestation, the fœtus being alive, the most dangerous in the whole range of surgery; hence it cannot be urged with too much force that, *when it is fairly evident that a woman has a tubal or broad ligament pregnancy, it should be dealt with by operation without delay.*

Dr. Braithwaite* has recorded a case in which he performed laparotomy, and removed a full-grown extra-uterine fœtus, which had been dead about three weeks. The placenta, adherent to the posterior surface of the uterus, was not interfered with. The wound was closed except at its lower angle, where the funis was left hanging out; and a drainage-tube inserted. In this instance the patient slowly recovered, and the placenta did not come away.

In the discussion which followed the reading of the history of this case, Dr. Champneys made the ingenious suggestion that in order to prevent sepsis of the placenta an attempt might be made to peel off the amnion and wash out the vessels of the funis with boro-glyceride; this solution would be harmless if absorbed.

Another objection that has been urged against leaving

* *Trans. Obstet. Soc., London*, vol. xxviii. p. 33.

the placenta is that it may continue to grow. This need not be seriously entertained. It is beyond doubt that in cases of tubal gestation the placenta is large out of all proportion to the embryo, and in many cases a small shrivelled fœtus, which has been dead many weeks, is found attached to a placenta larger than an ordinary placenta of a full-time uterine gestation. Even allowing a large margin for hæmorrhages into the placenta, I feel convinced that an extra-uterine placenta in some cases continues to grow after the *premature* death of the fœtus. But no one, so far as I am aware, has succeeded in proving that after *removal* of the fœtus the placenta, when left behind, has continued to grow. Until this has been demonstrated it is visionary to take it into account when seriously considering how to deal with the placenta.

It has been urged that if, after *primary* rupture, there is evidence that the child is developing in the broad ligament, operative interference should be deferred until the seventh month, unless urgent symptoms arise, as there may be a prospect of saving the child's life. To my mind, this is an objectionable practice, for the following reasons:—

1. Extra-uterine children are puny, ill-developed, and in a large proportion of cases malformed.
2. They rarely survive the delivery many weeks, at most months. Of the six cases arranged on the subjoined table, five were dead before the end of the first year.
3. In endeavouring to save the life of an unsatisfactory child, the more valuable life of the mother is frequently sacrificed. Compare tables on pages 424 and 425, which have been compiled for this purpose.

It is, of course, conceivable that in some cases the life of the child may be of very great importance.

Champneys* has dealt with this question from a much larger series of cases. I have confined myself entirely to the records of British surgeons, with the hope that some industrious authors in America, France, and Germany will furnish similar returns, gathered from cases reported in the periodical literature of these countries during the last ten or fifteen years. This would provide a trustworthy basis for guidance in this important matter.

OPERATIONS BY BRITISH SURGEONS, PERFORMED BETWEEN 7TH AND 9TH MONTH OF GESTATION—THE CHILD BEING ALIVE.

OPERATOR.	DATE OF PREGNANCY.	TREATMENT OF PLACENTA.	RESULT.	PLACE OF RECORD.
Jessop ...	33rd to 34th week.	Left. It decomposed, and came away between the 5th and 32nd day.	Mother recovered. Child died 11 months after birth.	*Trans. Obstet. Society*, vol. xviii. p. 261.
Lawson Tait	... ...	Placenta left ...	Mother died 4 days after operation. Protracted shock. *Child survived and has grown into an elegant woman.*†	*British Med. Jour.*, 1880, vol. i. p. 737.
Gervis ..	About full term.	Placenta left. Sac drained.	Mother died 56 hours after operation; hæmorrhage and peritonitis. Child lived six hours.	*British Med. Jour.*, vol. ii. p. 884.
Champneys	About 7th month.	Placenta left. Placenta decomposed.	Mother died from chronic septic intoxication, due to decomposition of placenta, 80 days after operation. Child died soon after operation.	*Trans. Obstet. Society*, vol. xxix. p. 456.
John Williams.	34th to 35th week.	Left. It gradually sloughed out piecemeal.	Mother recovered. Child lived only a few hours.	*Trans. Obstet. Soc., Lond.* vol. xxix. p. 482.
Taylor ..	... ...	Left. Decomposed, and was removed on 12th day. Profuse hæmorrhage.	Mother recovered. Child lived eleven months.	*Trans. Obstet. Soc., Lond.*, vol. xxxiii. p. 115.

* *Trans. Obstet. Soc., London*, vol. xxix. p. 476.

† Mr. Lawson Tait kindly furnished me with this fact in a letter.

After death of the fœtus at or near term.—Operations after the death of the fœtus are less complicated than when the child is alive and the placental circulation in full vigour. Not only is the proceeding from the operative point of view simplified, but the results, in so far as the mother is concerned, are much more satisfactory.

For instance, in the preceding list of operations performed in England for extra-uterine gestation in which the fœtus was between the seventh and ninth month, and alive at the time of the operation, there were six cases, with three recoveries. In the subjoined list of seven cases, in which the operation was performed for the removal of a dead fœtus varying in ages from the seventh to the ninth month, all the mothers recovered. Such records tell their own tale.

Operations for Extra-uterine Pregnancy after Death of the Child at or near Term.

Operator.	Length of Time after Death of Fœtus.	Condition of Child and Placenta.	Result.	Place of Record.
Braithwaite (James).	14 days after spurious labour at full term.	Placenta was left, and during the subsequent 3 weeks slowly sloughed out through the lower angle of wound.	Recovery	*Lancet*, 1885, vol. i. p. 7.
Braithwaite (James).	About 1 month ..	Placenta left: it was removed 6 weeks after operation.	Recovery	*Ibid.*
Braithwaite (James).	3 weeks	Placenta left: it never came away.	Recovery	*Trans. Obstet. Society*, vol. xxviii. p. 23.
Herman ...	2 months ...	Placenta weighed 28½ ounces, removed with fœtus, which weighed 3 lbs. 8 oz.	Recovery	*Trans. Obstet. Society*, vol. xxviii. p 144.
Cullingworth.	8 months ...	Placenta removed with fœtus; no umbilical cord, no hæmorrhage.	Recovery	*Trans. Obstet. Soc., London*, vol. xxx. p. 480.
Worrall of Sydney.	15 months ...	Placenta left: no mention of its subsequent behaviour.	Recovery	*Medical Press and Circular*, Mar. 25, 1891.
Sheild ...		Placenta removed: child decomposed, and its buttocks presenting through a sinus in an abdominal wall.	Recovery	*Trans. Obstet. Society*, vol. xxxiii. p. 148.

After decomposition of the fœtus and suppuration of the sac.—After death and decomposition of the fœtus, sinuses form, by which pus finds an exit, either through the rectum, vagina, bladder, uterus, or at some spot in the anterior abdominal wall below the umbilicus, accompanied by fragments of fœtal tissue and bones. The treatment in such cases is simplicity itself. The sinuses should be dilated, and all fragments removed from the cavity in which they lie. When this is thoroughly done, the sinuses will rapidly granulate and close. Partial operations are useless; if only a portion of a bone is allowed to remain, a troublesome sinus will persist.

Operations for the relief of tubal gestation through the vagina are not satisfactory, and have not found favour among surgeons. This method of operating has been fully discussed by Dr. Herman in a paper communicated to the Obstetrical Society, London, in 1887.

Dr. Herman has collected thirty-three cases in which an extra-uterine gestation sac has been emptied through the vagina, and from an examination of them he drew the following conclusions:—

1. The operation of opening an extra-uterine gestation sac by the vagina early in pregnancy, before rupture has taken place, by the cautery, knife, or otherwise, is a dangerous and unscientific proceeding. Abdominal section ought at this time always to be preferred.
2. Immediately after rupture has taken place, when interference is called for to arrest internal hæmorrhage, the abdominal operation is more likely to be successful than the vaginal.
3. After rupture has taken place, and the effusion of blood has been followed by pyrexia, the indications for incision of the vagina are the same as in hæmatocele from any other cause.

4. At, or soon after, full term, before suppuration has taken place, there may be conditions which indicate delivery by the vagina as preferable to abdominal section. These are :—
5. When the fœtus is presenting by the head, feet, or breech, so that it can be extracted without altering its position ; and
6. When it is quite certain, from the thinness of the structures separating the presenting part from the vaginal canal, that the placenta is not implanted on this part of the sac, and it is not equally certain that the placenta is not attached to the anterior abdominal wall.
7. If the child cannot be delivered by the vagina without being turned, abdominal section should be performed.
8. No attempt should, as a rule, be made to remove the placenta.
9. The after-treatment should consist in frequent washing out of the sac.
10. After suppuration has taken place, the opening of the sac into the vagina is one of the more favourable terminations.

A careful perusal of Dr. Herman's paper will serve to convince anyone who will take the trouble to compare the results with those obtained by the abdominal method, that delivery by the vagina is only suitable for cases in which the fœtus has decomposed, and the macerated remnants of its body are being discharged through a fistulous tract opening into this canal.

Part IV.

METHODS OF PERFORMING OPERATIONS FOR OVARIAN AND TUBAL DISEASES.

CHAPTER XXXVIII.

OVARIOTOMY.

Ovariotomy *signifies the removal through an abdominal incision of cystic and solid tumours of the ovary, cysts of the parovarium, and ovarian hydroceles.*

1. **Preparation of the patient.**—It is a great advantage, when it can be carried out, to keep the patient confined to bed two or three days immediately before the day of operation. She should be prepared as for any other serious surgical proceeding: the rectum should be emptied by means of enemata, and the patient should be strictly enjoined to take no food for several hours before the operation; this diminishes the chances of vomiting.

It is a great advantage to operate in the early morning, the patient should take a light meal about eight o'clock the preceding evening, and then abstain from food or drink until after the operation. In young patients this causes no inconvenience, but in elderly women it is necessary to modify it by allowing some milk or a cup of tea in the early morning.

Before the surgeon's arrival the nurse prepares the patient. She should simply wear a clean linen night-dress, warm stockings, and a pair of plain flannel drawers.

Just before entering the room the bladder should be emptied naturally or by means of a catheter. In the meantime, the surgeon and his assistant prepare the instruments.

In addition to the ordinary instruments, such as knives, forceps, needles, sutures, etc., required in surgical operations generally, the following will be needed:—A pedicle-needle and silk of various thicknesses for tying the pedicle, an ovariotomy trocar for tapping the cyst, strong and trustworthy forceps for seizing the cyst wall or pedicle, a clamp, or a serre-nœud, transfixing pins, and glass drainage-tubes of various sizes.

Sponges and forceps should always be counted before the operation, and the number written down.

The water in which the sponges are immersed must be about the ordinary temperature of the body. The fluid used for the immersion of instruments varies with the fancy of the operator. Equally good results in practised hands follow the employment of tepid water or solutions of carbolic or boracic acid. It will be wise for beginners to employ strict antiseptic precautions, and then modify them as they acquire experience.

The spray is a useless and not altogether harmless encumbrance.

The nurse.—Success in ovariotomy depends in no small measure on the nursing. It is therefore desirable to employ a nurse who has had special training in "ovarian nursing." The most trustworthy nurses are those who love their work and willingly carry out implicitly the instructions of the surgeon. They must be able to pass a catheter or administer an enema without causing the patient pain; to understand the administration of liquid food in regular quantities and at fixed intervals; and above all things, they must not be chatterers.

The room.—The selection of a room for ovariotomy

is made on the same principles as for other major operations of surgery. In hospital practice it is the fashion to perform ovariotomy in a special room. This is quite unnecessary; I operate in the theatre, and treat the patient in a general ward with the most satisfactory results.

The table.—In arranging the table, it is necessary to place beneath the sheet or blanket on which the patient lies a broad piece of waterproof material. Many surgeons cover the patient's abdomen with a sheet of waterproof with a large hole cut in the centre. This serves to protect the patient's clothes, but it is cumbersome.

Anæsthesia.—Some surgeons advocate ether, others chloroform; each has its advantages and disadvantages. On the whole, I prefer chloroform, the patient being first rendered unconscious by nitrous oxide. This saves time and often struggling.

The abdominal incision.—The patient being completely under the influence of the anæsthetic, the pubes should be shaved, unless the nurse has done this previously. The surgeon, standing on the right-hand side of the table, the assistant being opposite him, divides the integuments in the middle of the abdomen, beginning a little below the umbilicus, and extending it downwards to the symphysis. As a rule, the first incision is about 7 cm. in length, and should extend through the skin and subcutaneous fat to the linea alba. Any bleeding vessels are immediately secured with forceps. The linea alba is then incised, and usually the sheath of the rectus of one or other side is opened. With a little care, it is easy to find the median strip of fibrous tissue; and care should be exercised in this, for if the surgeon fumbles about among the fibres of the rectus, he will be troubled with the small arteries belonging to that muscle. After dividing the sheath of the rectus, the sub-peritoneal tissue is exposed. This varies considerably in amount:

in spare subjects it is little more than a delicate layer of connective tissue; in fat subjects it may be very thick and granular, and resemble omentum.

At this stage the urachus may sometimes be recognised, and occasionally the bladder is spread out over the floor of the incision. An experienced operator quickly recognises the tissue of the bladder, but it may puzzle an inexperienced surgeon, and it has been opened by the scalpel, especially when, as is sometimes the case, it is pushed upwards by a pelvic tumour. The peritoneum is now exposed, and in order to open this without injuring the cyst or the intestine, a fold of it is picked up with dissecting forceps and cautiously pricked with the point of the scalpel.

Dividing the peritoneum is an important step in the operation. It may adhere to the tumour, and be cut through before the surgeon is aware of it, in which case he may cut through the cyst wall, mistaking it for peritoneum, and will be suddenly apprised of his error by the fluid gushing forth. When there is free fluid in the peritoneal cavity, it will flow out when the peritoneum is divided, and the operator may for a moment think he has opened the cyst. A more serious error is to mistake peritoneum for cyst wall, and set about detaching it from the parietes. As soon as the peritoneum has been opened, the edges should be held by pressure-forceps, whilst it is divided to an extent nearly equal to the skin wound. This may be done with a scalpel and director, or scissors, or a probe-pointed bistoury, using two fingers as a guide. Should the cyst be pricked so as to allow of the fluid escaping, the cut edges should be immediately seized with forceps and drawn out through the wound.

The peritoneal cavity being opened, the operator anxiously looks for the glistening surface of the ovarian cyst, and then inserts the fingers, and sweeps them over

the wall of the tumour to ascertain the existence or absence of adhesions.

Instead of the typical ovarian cyst, he may find a condition of things which requires investigation before proceeding further. The tumour may be solid or uterine in origin; the escape of bloody fluid and small secondary knots on the parietal peritoneum, omentum, and intestines may suggest malignancy. The adhesions may be so numerous that he hesitates to continue the operation.

It is of the highest importance to be satisfied as to the nature of the tumour; to plunge a trocar into a pregnant uterus or a uterine tumour is an accident which involves the operator in anxious difficulty.

Decomposing fluid, tenacious mucus from a ruptured cyst, or blood may obscure the parts. Such may be washed away by irrigating the cavity with water at 110°. This is far more satisfactory and much quicker than sponging, and has the advantage of not fouling the sponges.

Much free blood in the peritoneal cavity suggests rupture of a gravid tube, tubal abortion, or secondary rupture of a gestation sac. More rarely it is due to rupture of an ovarian cyst, secondary to twisting of the pedicle.

Emptying the cyst.—Feeling satisfied that the tumour contains fluid, and is unconnected with the uterus, the operator proceeds to tap it. The trocar is thrust into the cyst, and the fluid rushes through it to the receptacle beneath the table. As the cyst collapses the sharp edge of the trocar is rendered harmless by drawing it into the cannula; the cyst wall is seized with forceps, and drawn into the grasp of the spring hooks on the side of the trocar, and secured. As the cyst collapses, it is gently withdrawn through the incision, whilst the assistant keeps the abdominal wall closely applied to the cyst, and follows

its contraction by gentle pressure ; as the last part of the cyst passes through the incision he prevents the intestines from escaping by the prompt application of a sponge.

Tapping a cyst is not always so simple. The cyst may contract up to a point, and the fluid cease to flow ; this may be due to a large secondary cyst. The trocar may then be protruded from the cannula, and used to tap it. In some cases the fluid, when thick and viscid, flows with difficulty, or the tumour may be multilocular ; under such conditions, the operator removes the trocar, enlarging the opening in the cyst, inserts the hand, and then proceeds to break down the interior of the tumour, until its bulk is sufficiently reduced to allow of its escape through the abdominal wound, unless retained by adhesions.

Adhesions.—Although the surgeon may have had reason to suspect the presence of adhesions, frequently he finds none, and at other times, when he least suspects them, many exist. The most frequent adhesions are omental ; they are usually seized with forceps, ligatured with gut and then divided.

Large portions of *great omentum* may require ligature ; instead of being tied in a bunch, it should be transfixed with an aneurysm needle, armed with a piece of gut doubled, and the omentum tied in two, three, or four places, according to its width and thickness. Adherent *appendices epiploïcæ* are easily dealt with, but *intestinal adhesions* require care and patience. They are rarely tough, and may generally be detached, and if any vessel bleed it should be carefully secured.

The *vermiform appendix*, if firmly fixed to the tumour, may be encircled with gut, tied firmly, and cut through ; this is a safer plan than tearing, or otherwise damaging it in the process of detachment.

Should the intestines be torn the wound must be sewn up by a continuous suture of fine silk.

Adhesions to *parietal peritoneum* are best detached with the finger, and a sponge applied to check oozing.

When adhesions are extensive it may be necessary to enlarge the wound, especially when the cyst is adherent to the pelvic peritoneum, as the iliac veins, vena cava, or ureters are liable to be torn.

The pedicle.—When the tumour is drawn out of the abdomen the pedicle is in most cases readily recognised, the Fallopian tube being an excellent guide to it. The tissues constituting the pedicle of an ovarian tumour are the Fallopian tube and adjacent parts of the broad ligament, containing the ovarian artery, pampiniform plexus of veins, lymphatics, nerves, and ovarian ligament. When the tissues are not matted together the round ligament is readily seen, and should not be included in the ligature.

In tying a healthy pedicle, the aim should be to transfix the broad ligament at a spot where there are no large veins, and tie the structures in two bundles. The *inner* half contains the Fallopian tube, a fold of the broad ligament, and occasionally the ovarian ligament; the *outer* usually consists of the ovarian ligament, veins, ovarian artery, lymphatics, and a larger fold of the broad ligament than the inner half.

Pedicles differ greatly; they may be long and thin, or short and broad. In some instances they are wanting, and in the case of *double fused cysts* two pedicles exist.

Before tying the pedicle the surgeon examines its relation to the uterus, ascertains its freedom from adhesions, and the existence or otherwise of twists.

Long and thin pedicles are easily managed; the assistant supports the tumour firmly, but without dragging, or the tissues may be torn. The surgeon, with

the thumb and index of the left hand, spreads out the tissues, and then transfixes them with the pedicle needle armed with silk. The loop of silk is seized as soon as it appears on the opposite side, and the needle withdrawn.

Care must be taken during the transfixion not to prick any adjacent coil of bowel, and not thrust the needle through the pedicle to an unnecessary extent. The threads must now be tied; for this purpose the loop of silk is cut with scissors, so that two ligatures lie in the pedicle.

The proper ends of each piece of silk are secured, and the thread intended for the outer half of the pedicle is made to cross that intended for the inner half. The threads are then tied firmly; the outer half should be secured first. The particular knot employed is of little consequence, so long as it is one that will hold firmly. In tying the threads some little care is necessary; it should be done with steadiness and firmness; any jerking is apt to break the silk and cause trouble, besides the risk of lacerating the tissue of the pedicles; whereas, if the parts are not tightly embraced by the silk, they will slip out of the ligature and begin to bleed. When this happens, after the wound has been closed and the patient returned to bed, it leads not infrequently to fatal consequences. In order to avoid this, there are certain points which need attention.

When the pedicle is thin the method just described is quite a safe way of applying the ligature, but with this precaution: as the surgeon ties the knot the assistant must gently relax the parts by supporting the tumour without allowing it to drag on the pedicle.

The *knots* employed to secure the threads are various: a properly applied reef knot answers all practical purposes, and is as simple as it is efficient. It may be

necessary in some cases for greater safety to bring the two ends of the inner thread around the entire pedicle, and tie them again, taking care that the threads lie in the groove formed by the ligatures already applied. In practising this manœuvre, it is advisable to fasten the inner thread with three knots instead of two, for if the ends should be crossed over the knot it may be loosened instead of tightened. The plan of tying the pedicles in two pieces, and then encircling it with a separate thread, is not to be recommended.

After the operator has gained some experience in this simple mode of tying the pedicle, he may then, if he thinks it desirable, practise other methods.

After securely applying the ligature, the tumour is removed by snipping through the tissues on the distal side of the ligature with scissors. Care must be taken not to cut too near the silk, or the stump will slip through the ligature; on the other hand, too much tissue must not be left behind. The stump is seized on each side by pressure forceps, and examined to see that the vessels in it are secure; it is then allowed to retreat into the abdomen. Should it commence to bleed, it must be re-transfixed and tied below the original ligature.

Occasionally a broad short pedicle will contain so much tissue that it will be necessary to tie it with three threads. To do this, the pedicle is transfixed with the silk, the loop is divided, and the two threads are interlocked. The outer thread is tied as usual. The needle is re-filled with a single ligature, and transfixion performed. The needle is then unthreaded, and the untied end of the silk belonging to the first ligature is passed into the eye of the needle, which is then withdrawn. The second ligature, before it is tied, must be interlocked with the third thread. When the threads are tied they will hold the tissues firmly.

It is impossible to frame absolute rules for ligaturing the pedicle. In this, as in all departments of surgery, common sense must be exercised, and at the present day, when ovariotomy is practised so widely, no one would think of performing this operation without assisting, or watching its actual performance by, an experienced surgeon.

In a few rare cases the pedicle may be so tightly twisted or so attenuated by the dragging of the tumour that it will only require encircling with a simple ligature without transfixion.

In those rare cases in which the tumour has been gradually detached from its uterine connections it has no proper pedicle. Unless the operator is aware of this he may be exceedingly puzzled. Sometimes the tissues of the pedicles are inflamed; they are then so soft that they easily lacerate when the ligatures are drawn tight. In double-fused ovarian cysts two pedicles require ligatures.

Sessile cysts lying deeply between the layers of the broad ligament cannot be treated in this way. The surgeon taps the cyst, and finds that as the fluid escapes he cannot draw the tumour through the wound; he then proceeds to enucleate it in the following manner. It is usually necessary to enlarge the abdominal wound; the capsule of the cyst, formed by the thickened broad ligament, is torn with dissecting forceps, or scraped through with a knife until the cyst wall is exposed, then with the fingers the connective tissue between the cyst and its capsule is detached, taking every care not to lacerate the capsule; any bleeding vessel is immediately seized with forceps. In this way the cyst is completely shelled out of its bed. In some cases the cyst wall is so firmly held in the floor of the pelvis that it involves too much risk to remove it. Sometimes the base of the

cyst when held in this way may be transfixed and tied. As soon as the cyst is removed all bleeding must be immediately checked. The treatment of the capsule varies. Sometimes it is possible after enucleation of moderate-sized tumours to gather the loose capsule into a fold, transfix, and ligature it like an ordinary pedicle. When the tumour is large and has burrowed deeply this should not be done, as oozing takes place in the recesses of the cavity, and will sometimes form a large hæmatoma. To prevent this the edges of the capsule are stitched to the lower extremity of the abdominal wound and drained. It occasionally happens that an attempt is made to enucleate a cyst, but its deeper parts are so firmly attached as to cause the surgeon to desist. In such cases the edges of the cyst and capsule are stitched to the abdominal wound and the cavity is drained.

Cauterising the pedicle.—This method of dealing with the pedicle is carried out in the following way:—As soon as the tumour is removed the pedicle is secured in a cautery clamp and screwed up tightly. The portion of the pedicle on the distal side of the clamp is then divided by a cautery iron at a dull red heat: the cauterisation is performed slowly and completely. The clamp is then cautiously relaxed, and should any spot bleed the clamp is screwed up again and the cautery re-applied. When the clamp is finally released it has a shrivelled, translucent, parchment-like appearance. It then retreats into the abdominal cavity. The time occupied in cauterising a pedicle varies from five to ten minutes.

This method has been brilliantly successful in the hands of Keith, but the ease and rapidity with which a pedicle is ligatured have caused the ligature to be almost universally employed.

Having safely disposed of the pedicle, any blood that has found its way into the peritoneal cavity is now

carefully removed by gentle sponging. The surgeon then examines the remaining ovary: should it be found obviously diseased, he removes it. Partial removal of a diseased ovary, advocated by a few, is open to many objections. A small clean flat sponge is now placed over the intestines which are in relation with the wound. This serves to prevent blood gaining access to the peritoneal cavity which may escape from the wound or needle punctures, and prevents the threads from getting entangled in the intestines or omentum. *Instructions should now be given to count the sponges and forceps.* The sutures are now inserted; for this purpose silk, plain or waxed, or silkworm gut may be used. Most surgeons prefer silk. A stout needle is attached to each end of the thread, as this enables the needle to be passed from the peritoneum towards the skin on each side of the wound. It is best to commence at the upper angle of the wound. The sutures should be inserted at intervals of half an inch, and must be parallel to each other. In passing the suture the needle should traverse the peritoneum, then each layer of the aponeurosis of the rectus muscle, and lastly the integument, the needle emerging about a quarter of an inch from the margin of the wound. When sufficient threads have been inserted they are gathered up on each side of the wound and grasped with forceps, or each suture may be secured temporarily with forceps as soon as it is passed.

Before proceeding to fasten the sutures they should be carefully drawn aside, and a sponge in the sponge-forceps, or in a holder, carefully introduced into the recto-vaginal pouch. This *tell-tale* sponge indicates the existence of oozing, and if it comes up quite clean all is well, and the wound may be closed. Should the sponge return bloody, the pedicle is examined and any bleeding point immediately secured. This is an important rule:—

Never close the abdominal wound without using the tell-tale sponge even in what appears to be the simplest case.

Some of the sutures are now tied, and then the protecting sponge is withdrawn and the wound is completely closed. The mutual pressure of the cut surfaces restrains hæmorrhage, and it is never needful to ligature vessels in the wounds. The skin edges are carefully co-apted, and should they gape, a few superficial sutures may be inserted. In tying the deep sutures the aim should be to fasten them with sufficient firmness to keep the parts in apposition; excessive tightness interferes with union. The ends of the sutures are cut away and the wound is dressed. The simplest mode of dressing, and one I employ with the happiest results, is to apply a double fold of boric lint to the wound: over this is arranged a pad of charpie, and then two or three folds of absorbent cotton-wool. A flannel binder is then adjusted, and fastened firmly with safety-pins. This dressing is rarely touched before the seventh day, and then alternate sutures are removed. The remainder are withdrawn two days later, and the wound is usually found soundly healed.

If it is the fashion of the surgeon to employ antiseptic rather than aseptic principles, he will use carbolic gauze, oil-silk, or other materials, according to the principles of true Listerism. When the case is one in which the surgeon deems it necessary to resort to *drainage*, the final stages of the operation are somewhat modified. (*See* chapter xl.)

It is not too much to state that success in ovariotomy depends in a large measure upon *decision* on the part of the surgeon; he should also exercise *care* even in apparently trifling matters of detail; there should be no unnecessary manipulation of the parts, no fussiness, but extreme *gentleness* and the most scrupulous *cleanliness*,

and the operation should be conducted with as much *expedition* as is consistent with thoroughness. The exhibition of these qualities always indicates an experienced and successful operator.

Clumsy and injudicious operators always attribute their failures to nurse, sponges, surroundings, or even the patient. All such should remember what Keith* wrote: "For my own part, when a case goes wrong after an operation, I have seldom to look far beyond myself for the cause of failure: something done, something not done. This is a lesson hard to learn. We blame persons, things, accidents, and circumstances rather than ourselves."

Incomplete ovariotomy.—In the course of an ovariotomy the operator may find it impossible to remove the cyst, in consequence of its deep and firm adhesion to important structures in the pelvis. The hopelessness of the task may not be appreciated until after the contents of the cyst have been evacuated. Under such conditions the only course left to the surgeon is to stitch the edges of the opening he has made in the cyst to the margins of the abdominal incision, and leave it to drain. This was at one time the usual method of treating ovarian cysts. It has been, and with good reason, long abandoned as a routine proceeding.

When a cyst has been in this way stitched to the abdominal wound, the walls of the cyst gradually suppurate, and the cyst is converted into an abscess cavity. Sometimes it will shrink to very small proportions, but rarely closes completely.

I have seen this method practised with irremovable multilocular oöphoritic cysts and with dermoids. As a rule, the patients die slowly, exhausted by the continual

* *Brit. Med. Journal*, 1878, vol. ii. p. 590.

discharge of pus, months and in some cases two and even three years after the operation.

The after-treatment.—The patient is returned to bed with gentleness, to avoid vomiting; a pillow is placed under her knees, and if there is evidence of much shock a hot-water bottle should be applied to the feet, remembering that the patient is unconscious, or she will run the chance of having the feet blistered unless the nurse exercises due watchfulness.

In a short time the patient recovers consciousness and complains of pain; as a rule there is vomiting, the result of the anæsthetic, and thirst.

When the pain is very severe a quarter of a grain of morphia may be given, in the form of a suppository, a few hours after the operation; should the pain continue, this may be repeated in the course of six hours. In many cases no opium is required, and the routine use of this drug is, to say the least, injudicious.

Vomiting.—This result of the anæsthetic is sometimes troublesome. It is best avoided by keeping the stomach empty for twenty-four hours. To relieve the thirst the patient is allowed to wash the mouth with cold water, but on no account to swallow it.

Young patients easily bear this apparently prolonged fast, but in the case of patients exhausted by disease, prolonged operation, or loss of blood, abstinence of this character would be disastrous. Under such conditions a nutrient enema, consisting of beef-tea or milk, with a small quantity of brandy, administered at intervals of six hours, is most useful. Should it be necessary to prescribe opium in such cases, twenty drops of Battley's solution may be added to one of the enemata.

At the end of twenty-four hours small quantities of barley-water or milk and water should be given, and if retained, then milk is given more frequently, and

subsequently beef-tea. If at the end of three days no untoward symptoms arise, chicken jelly, pounded chicken, or boiled fish is allowed, and the patient soon gets well enough to take convalescent diet. No precise rule can be formulated for dieting patients: some cannot take milk, others reject beef-tea. My custom is to keep them on milk diet for three days, and if there is no vomiting, then try solids cautiously. When vomiting is troublesome with liquid diet, this may be suspended for several hours, and nutrient enemata substituted.

When vomiting continues more than twenty-four hours after an operation, especially when accompanied by increased frequency of pulse and distension of the belly, it is usually an unfavourable sign. Slight vomiting, with no distension and a normal pulse rate, need not occasion alarm.

The bladder.—For the first twenty-four hours the urine is drawn off by the nurse by means of a soft catheter. This instrument, when not in actual use, must be kept in clean water or mild antiseptic solution. It must be thoroughly washed each time it is used; in passing it into the bladder the nurse should wipe away the mucus around the urethral orifice, so as to avoid carrying infection into the bladder. Even with a thoroughly trustworthy nurse it is well to be suspicious of the catheter, and it is a safe plan to encourage the patient, after the first day, to pass water by her own efforts. Unfortunately, many women cannot micturate when lying on their backs. Cleanliness and care with the catheter must be strictly enforced; cystitis causes much misery.

Temperature.—This should be observed every four or six hours, and duly recorded in the note-book. The first record after the operation is usually sub-normal, and in twelve hours becomes normal, and may even be raised half a degree. During the first twenty-four hours it may

ascend to 100 without causing alarm; beyond this, especially if accompanied by a rapid pulse, an anxious face, and distended belly, it is sufficient to make the surgeon anxious. A temperature of 101° or 102°, unaccompanied by other unfavourable symptoms, is not a cause for alarm unless maintained.

Pulse.—This is a valuable guide, and even more trustworthy than the temperature. When the pulse remains steady and full there is no cause for alarm. When it increases in frequency to 120 or 130 or more beats in the minute, is thin and thready, then there is danger, even with the temperature only slightly raised.

Distension of the abdomen is due to the accumulation of gas in the intestines; it is usually first observed in the transverse colon. It occasions in some cases much discomfort and it is not always easy to relieve it. The passage of the rectal tube is useful, or a simple enema; a saline purge is recommended by some surgeons.

Metrostaxis.—After operations for the removal of both ovaries and tubes, blood sometimes escapes from the uterus and simulates menstruation. It usually occurs within the first forty-eight hours after the operation. Metrostaxis occurs in or about one half the cases, and has nothing to do with menstruation.

Bowels.—At the end of four or five days the bowels will occasionally act of their own accord; usually, however, it is necessary to use a simple enema, and this is, in the majority of cases, quite efficient. When opium has been freely administered, still more active measures may be required.

Sutures.—On the seventh or eighth day the sutures will require removal. It is a good plan to allow two to remain (taking care not to leave those that are causing irritation) twenty-four hours longer. After removing the sutures a broad band of adhesive plaster should be firmly

fastened across the abdomen, with a good grip on each hip. This precaution is necessary, as an incautious or violent movement, such as coughing or straining, may cause the skin edges of the wound to gape.

Should suppuration or stitch-hole abscesses occur—and these are rare—they must be treated on general principles. *Erysipelas* may attack the abdominal wound, and retard convalescence.

Bed sores may give trouble after ovariotomy in an elderly and enfeebled patient, as after any other surgical procedure which requires the patient to remain for several consecutive days upon her back. With due care and watchfulness on the part of the nurse a bed sore should rarely occur.

The cicatrix.—In nearly all instances the abdominal wound rapidly heals. Occasionally a case is met with in which, after removal of the stitches, the wound has gaped, and the edges of the incision re-open down to the peritoneum. This membrane fortunately rapidly unites, so that in cases where the wound does not repair the peritoneum serves to restrain the abdominal contents. I once made a *post mortem* examination on a woman seven weeks after an oöphorectomy, in which there was not the slightest attempt at union in the wound outside the peritoneum. With very rare exceptions, the parietal wound heals rapidly, and the chief trouble is to restrain the patient from moving about too quickly. Care in this respect is very necessary, otherwise the cicatrix yields, and a troublesome hernia is the result. After abdominal section, even where the wound heals as quickly as is possible, the patient should be kept confined to bed twenty-one days or a month, and not allowed to get up at the end of that time unless she wears a comfortable and correctly-fitted abdominal belt. This she should be instructed to wear for at least a year; and during that

time the patient should be strongly warned against moving about without it. Even at the end of the year, should the scar show indications of yielding, the use of the belt should be continued.

Many causes have been suggested for a yielding cicatrix, such as suppuration of the wound, inserting the sutures too far apart, failure to include all the tissues of the abdominal wall in the sutures, or laborious occupation.

My own experience has been that in those cases which unite rapidly, and the patient when allowed to get about too early has neglected the use of the belt, the scar yields most. Since I have adopted the plan of keeping them in bed, even the most favourable cases, from twenty-one to twenty-eight days, and insisted on the use of the belt, this complication has ceased to cause me trouble.

Cases have been described in which the abdominal cicatrix has become the seat of cancer. Unfortunately, those who have recorded such conditions have not fortified their statements by descriptions of the histological characters of the so-called cancer.

CHAPTER XXXIX.

OÖPHORECTOMY.

Oöphorectomy *signifies the removal through an abdominal incision of the ovaries and Fallopian tubes, for affections mainly inflammatory; also the removal of healthy ovaries and tubes to anticipate the menopause.*

The term is open to much criticism; so are many other names in common use in surgery.

The *inflammatory conditions* in which it is employed are :—

1. Pyosalpinx and tubo-ovarian abscess.
2. Hydrosalpinx.
3. Tubercular salpingitis.
4. Ovarian abscess.

It is employed to *anticipate the menopause* in :—

Uterine myomata.

This is also the principle on which the operation is based for the relief of such conditions as :—

1. Hystero-epilepsy.
2. Epilepsy.
3. Some forms of insanity.
4. Dysmenorrhœa, unassociated with demonstrable disease of the ovaries.

The operation has been performed chiefly on empirical grounds in :—

1. Watery discharges from the uterus.*
2. Ill-developed ovaries.†
3. Osteomalacia.‡

* Skene Keith : *Lancet*, 1891, vol. i. p. 985.
† Dr. William Duncan : *Lancet*, 1891, vol. i. p. 187.
‡ Hofmeier : *Centralblatt für Gyn.*, March 21st, 1891.

Other conditions treated by oöphorectomy are:—

1. Tumours of the Fallopian tubes { myoma, adenoma, carcinoma.
2. So-called prolapsed ovary.
3. Early tubal pregnancy.
4. Apoplexy of the ovary.

For the performance of oöphorectomy the patient is prepared in the same manner as for ovariotomy; and the instruments needed are much the same, except that the large trocar will not be required. As a rule, the incision is longer than in simple ovariotomy, but the stages are identical until the peritoneal cavity is opened. The subsequent stages of the proceeding are different. Not infrequently the surgeon finds, after dividing the peritoneum, the omentum adherent to the parietes, and it is necessary to separate it very carefully and cautiously, in order to gain access to the pelvic cavity. He then seeks the ovary and tube of one or other side; should he meet with difficulty in finding them, it is a useful plan to ascertain the position of the uterus, and use that as a guide. In many cases the organs are recognised without the slightest difficulty, and are easily drawn up to the level of the wound; in others, recognition of the parts is difficult, and when their position is made out, they may be so bound down by dense adhesions that they cannot be raised to the level of the incision. On meeting dense tough adhesions it is usual to insert a large flat sponge, in order to exclude the intestines from the pelvis, and then let the assistant carefully keep the wound open by means of broad retractors. In this way it will be possible to see the parts, and if necessary, illuminate the recesses of the pelvis by means of a reflector or electric light, which should exist in every well-appointed operating-theatre.

When the ovary and tube are sufficiently freed they

are seized with a pair of large forceps. None are more useful for this purpose than those known as ovum or sponge-forceps. The surrounding parts are protected by sponges, and the pedicle transfixed by means of a pedicle-needle or an ordinary needle in handle, the greatest care being exercised that the instrument does not transfix or prick a piece of bowel which may be lying near or adherent to the pedicle. The silk is then tied in the same manner as in ovariotomy. At the time of tying the ligature the assistant gently relaxes the grip of the forceps, and the knot will be felt to tighten.

In many cases, especially with a well-trained and experienced assistant, the forceps are unnecessary, as he will be able to hold the parts with his thumb and forefinger.

When the tissues are soft, from long-standing inflammation, a clumsy assistant may, by injudiciously dragging on the forceps, tear them. Unless the surgeon and assistant are accustomed to work together, the surgeon needs to be on his guard against excessive zeal on the part of the latter.

When a distended tube exists, and the fluid may be pus, caution in separating adhesions and raising it is very necessary; and in spite of care and skill, it happens that just at the moment of raising the tube into view, the wall of the cavity yields and the fluid escapes. This constitutes an additional reason for completely isolating the parts by means of sponges. The application of the ligature is often a source of anxiety: the infiltrated tissues are so soft in some cases, that any undue force or jerking of the ligature will tear them, and necessitate re-transfixion.

When the ligature is satisfactorily applied the distal parts are cut away with scissors; the cut surface is then examined, to ascertain that no inflamed or suppurating

tissue is left behind. If this is the case, and it cannot be dissected out without endangering the ligatures, the parts should be re-transfixed and tied.

When it has been found necessary to remove the ovary and tube on one side for inflammatory disease, experience teaches the necessity of removing the parts on the opposite side, or the operation will fail to be beneficial.

The remaining steps of the operation are conducted on the same principles as in ovariotomy.

When oöphorectomy is performed for the purpose of artificially inducing the menopause in cases of uterine myomata, it may occasionally be a relatively easy operation; but with very large tumours it is very difficult, and often impossible, to remove completely the ovaries and tubes.

The great danger of this operation with large tumours is due to several circumstances. In the first place, the broad ligaments and tubes are so stretched that when the parts are tied and cut away, the tension upon the ligatures is so great that they slip off. When this happens in the course of the operation, it is sometimes very difficult to discover and secure the vessels, and in very many cases it has been necessary to perform hysterectomy to control the bleeding. Should the accident happen after the patient has been returned to bed, it has in most cases a fatal termination.

Not infrequently the ovaries and tube of one side are free, and easily removed, but those of the opposite side are so embedded in the tumour, or the ovary may be elongated into a long rounded cord and embedded in the midst of a formidable plexus of veins, that its removal is impossible. This will nullify the operation, for the presence of even a portion of ovarian tissue is sufficient to ensure the persistence of menstruation. In carrying

out the necessary manipulations within the abdomen every care must be exercised to prevent the least injury to the capsule of the tumour, for they bleed very freely even from the least puncture ; as the tissues are exceedingly tense, it is no easy matter to arrest the hæmorrhage, except by the performance of hysterectomy.

Salpingostomy is a conservative operation, introduced by Skutsch,* of Jena. It consists in removing the fluid contents of a distended Fallopian tube by means of a Pravaz syringe, to ascertain its freedom from pus. The occluded ostium is re-opened, the fluid allowed to escape, and a piece of the tubal wall cut away. The mucous and serous membranes are then united along the margin of the artificial opening by fine silk thread. A sound is then passed from the tube into the uterus.

The sequelæ of oöphorectomy are considered, with those of ovariotomy, in chapter xli. The *remote effects* of the removal of the ovaries are discussed in chapter xlii.

* *Centralblatt für Gyn.*, 1889.

CHAPTER XI.

IRRIGATION AND DRAINAGE.

Irrigation of, or, as it is frequently termed, flushing, the peritoneum is an exceedingly useful proceeding when there has been an escape of fluid, septic material, or extensive hæmorrhage previous to or during the performance of abdominal section. The principle consists simply in washing out the peritoneal cavity with warm water; the particular method employed matters but little.

In hospital practice the method I employ is the following:—The irrigating vessel is an ordinary bedroom can, capable of holding two gallons of fluid. In the front part of it, two inches from the bottom, there is a stop-cock connected with an indiarubber delivery-tube 1½ m. in length and 2 cm. in diameter. When an abdomen requires irrigation, the can is filled with plain water at a temperature of 110° to 115° Fahr., determined by a thermometer kept for the purpose. It is necessary to be particular in this respect, and never guess at the heat of the water according to the sensations imparted to the hands of the nurse or assistant. The patient is then turned a little to one side, and a dresser or nurse elevates the can, and a steady forcible stream flows through the tube. The surgeon introduces his left hand into the abdomen, and restrains the intestines from being carried through the wound with the outflowing stream. The water, by means of the flexible tube, is conveyed to all parts of the abdomen, whilst the movements of the left

hand among the viscera prevent clots from being retained in the various recesses. The tube must be directed deeply in the recto-vaginal pouch, so as to wash out blood lying in that situation and also in the iliac fossæ. The water, which was at first discoloured by blood, pus, or serum, according to circumstances, quickly comes away clear, unless there is oozing or free bleeding. In this case, a little experience soon enables the surgeon to tell if it be of any extent, and he at once seeks for the spot whence the blood comes. As soon as the water issues from the abdomen as clear as it entered, the irrigation is stopped, and the retained fluid is quickly taken up with sponges.

The reason for turning the patient to one side is to allow the water to flow to that side, and it is easily caught in some convenient receptacle. The large sheet of water-proof on which the patient is placed at the commencement of the operation keeps the bed dry, and is easily converted into a trough to collect any water which may escape the smaller receptacle held by the assistant, and direct it into a foot-pan under the bed. Irrigation may in this way be accomplished quickly, and without fuss or causing slop around the table.

When the surgeon is satisfied that the parts are clean, and he has sponged up the fluid in the pelvis, he should lodge two large sponges in the recto-vaginal pouch to soak up fluid as it trickles down from the loins or from among the coils of intestines, whilst he inserts the sutures in the wound. By the time he has done this the peritoneum is usually dry, and he removes the sponges and closes the wound, unless it is a case demanding drainage.

In cases occurring in private houses where irrigation is necessary, the water may be poured into the belly from a large jug, taking care that it enters in a steady, full, but

not forcible stream. The peritoneum may also be admirably irrigated by filling a large ewer with water, and using a long and wide piece of drainage-tube on the syphon principle.

In this, as in all other departments of surgery, much may be accomplished by the exercise of a little common sense. It should be mentioned that when the surgeon uses sublimate, or similar solutions, the reservoir should be of glass or porcelain rather than of metal. He should always remember the danger necessarily involved by the presence of large quantities of even weak solutions of such a poisonous substance as perchloride of mercury.

Plain water is the safest medium for irrigating the peritoneal cavity.

Irrigation is always indicated when there has been much oozing from the separation of many adhesions, or an escape of pus, or the presence of much blood, as in rupture of an ovarian cyst, a gravid tube, or a tubal abortion. The proceeding is not limited to the needs of the ovariotomist, but is of great use when operations are undertaken for ruptured viscera, etc.

Water at 110° to 115° is comfortably borne by the peritoneum, and at this temperature it does not cause shock, but cleanses the peritoneum, and acts as an admirable hæmostatic to oozing surfaces.

Irrigation does not of necessity entail the subsequent use of a drainage-tube, and in many instances renders its employment unnecessary.

Drainage.—After the removal of an adherent tumour, and the various bleeding vessels have been duly ligatured, it occasionally happens that blood oozes into the peritoneal cavity from a number of capillary vessels too small, or in situations inaccessible, to permit the application of a ligature. Such oozing is frequently arrested by irrigation. When the surgeon apprehends

during the reaction a recurrence of the oozing, he employs a drainage-tube.

The tubes employed for this purpose are made of glass, and of different sizes. Those most frequently used are the patterns introduced by Koeberlé and Keith.

Koeberlé's drainage-tube is shaped like a test-tube, except that it tapers somewhat, and is perforated throughout its length. The smooth rounded end prevents damage to the peritoneum at the bottom of the pelvis ; the fluid enters the tube through the perforations.

Keith's drainage-tube is the most useful ; it is open at the bottom as well as at the top, and the perforations only involve the lower third of the tube. Near the orifice of the tube there is a projecting ridge. When the surgeon decides to drain, he selects a tube which will reach to the bottom of the recto-vaginal pouch, whilst the rim at the upper part of the tube lies in contact with the skin, and prevents the tube from slipping into the abdomen.

The tube is introduced in the following manner: The left hand is passed into the recto-vaginal pouch and the intestine held back, whilst with the right hand the tube is passed downwards until its end rests upon the floor of the pelvis, and not upon a coil of gut : the tube should lodge in the lower angle of the wound, between the last two sutures. The wound is then closed in the ordinary manner. A piece of indiarubber cloth is fixed on to the tube, and a small conical antiseptic sponge placed over its orifice, and the four corners of the cloth are folded together ; this collects fluid escaping from the tube, and keeps the dressing dry. It is not necessary to cover the end of the tube in this way. Frequently I adjust a piece of waterproof material over the tube, and loosely fix a piece of absorbent cotton-wool in its orifice. The

nurse examines the tube from time to time, and as the fluid accumulates she empties it by means of a glass syringe, armed with a piece of narrow flexible tubing. The tubing is inserted three-quarters of the distance down the drainage-tube, and as the nurse exhausts the syringe the contents of the tube flow into it. The greatest care must be exercised to keep this syringe and tubing clean; when not being actually used, it should be kept immersed in whatever antiseptic solution the surgeon selects.

For the first few hours the tube requires frequent attention, especially when irrigation has been resorted to. The fluid first evacuated is deeply stained with blood, but gradually gets of a lighter tint and diminishes in quantity.

During the first twelve hours several ounces of blood-stained fluid may require removal through the tube. During the succeeding twelve hours perhaps only two ounces will be withdrawn, and on the second day perhaps only a few drachms. The tube should be then removed. It is impossible to formulate precisely the length of time the drainage-tube should be retained *in situ*. In some cases twenty-four hours are long enough, whilst others will require it sixty or more hours.

The following simple rules may serve as a guide to those who have had little or no experience of drainage:—

1. As long as the fluid collects in the tube and is blood-stained, drainage must be continued.
2. When the fluid which rises in the tube is free from blood or pus, remove the tube.
3. When the fluid accumulates in the tube at the rate of an ounce in twelve hours, it may be dispensed with.

4. When the tube is retained for more than one day, it should be moved a little and gently rotated: this prevents omentum from insinuating itself into the perforations of the tube.

Keith's tubes are useful for draining the cavity left after the enucleation of sessile cysts and gestation sacs. Drainage is not only useful in enabling fluid to escape from the peritoneum, but it acts as a sentinel, and gives warning of hæmorrhage.

When the abdominal wound is closed, the patient returned to bed, and reaction is established, the bleeding may be free. When this is the case, it escapes through the tube. Such conditions must be treated on the principles that apply to recurrent or intermediate hæmorrhage in other situations—viz. open the wound, and search for the bleeding point; this is rarely necessary.

Drainage is rarely required after ovariotomy. It is occasionally advisable when tumours have been enucleated from the broad ligament, especially when they have burrowed deeply. It is most frequently needed after the removal of a firmly-adherent pyosalpinx with firm vascular adhesions deep in the pelvis, and in cases of gravid tubes that have ruptured.

The routine use of the tube is to be condemned.

The *disadvantages* of drainage must not be overlooked. The chief objections which have been urged are the following:—

1. It retards the union of the wound.
2. Drainage of the whole peritoneal cavity is only possible during the first forty-eight hours, as the track of the tube becomes surrounded by adherent intestine.
3. The admission of air may induce peritonitis, or lead to the formation of a sinus.

4. Ligatures are more likely to come away when drainage has been employed.
5. The tube may press upon and cause sloughing of a piece of gut.
6. Omentum may insinuate itself in the openings of the tube, and lead to difficulty when the tube is withdrawn.
7. A yielding scar is said to be more common after the use of the tube.

When drainage is judiciously employed, the good results overbalance these disadvantages. This chapter may be suitably closed with the following opinion of its usefulness from Keith :—*

"It was to Koeberlé that I am indebted for the idea. He kindly gave me two of his small tubes in 1866. These were soon found to be too narrow and too short. They got easily choked with clot or lymph. For the last ten years I have used the large glass tubes now in common use. Till I had learned in what cases to drain, the tube was used in alternate cases of the severe operations. I am as certain as I am of my own existence that had I used them earlier and oftener, the mortality would have been less by one-third. These tubes I supplied to ovariotomist friends in all parts of the world, though no one used them, so far as I know, till attention was called to drainage by the vagina by Dr. Marion Sims—a method which seems to me to be one calculated rather to give rise to blood-poisoning than to save the patient from it. It is remarkable that the only year in which the mortality of the Samaritan Hospital fell to ten per cent. was in 1876, when drainage by these glass tubes was first generally used."

* *Brit. Med. Journal*, 1878, vol. ii. p. 591.

CHAPTER XLI.

THE RISKS AND SEQUELÆ OF OVARIOTOMY AND ALLIED OPERATIONS.

THE performance of ovariotomy and allied operations is attended by several risks. They may be considered in two groups—immediate and remote.

The *immediate risks* are—shock, injury to viscera, hæmorrhage, peritonitis, septicæmia.

Shock.—The degree of shock varies greatly. It is rarely seen after exploratory operations, but the removal of even a small ovarian cyst is sometimes followed by profound collapse. It follows prolonged operations and enucleation of tumours from the broad ligament.

Generally the patient quickly reacts on her return to bed. After severe operations the patient may not regain consciousness for some hours, and occasionally collapse terminates in death.

Injury to viscera.—When describing the details of the operation, it was pointed out that the intestines are liable to be wounded whilst separating adhesions. They have also been injured by the needle during the transfixion of the pedicle, or pricked by needles during suture of the abdominal wound. Wounds of the intestines must be immediately secured by means of a continuous suture of fine silk.

The *bladder* has been punctured with the trocar in mistake for a cyst. It should be closed with a continuous suture, and the bladder tested with milk, or some bland fluid, in order to be sure that urine will not

leak between the sutures. The routine use of the catheter before operation ought to prevent injury to the bladder in abdominal operations.

The *ureter* has been injured during the separation of adhesions at the pelvic brim. This accident has necessitated nephrectomy.* Pozzi† is of opinion that the ureter is not infrequently wounded during the removal of an abdominal tumour. When the wound is small, the edges should be brought together by suture. When completely severed, the proximal end should be stitched to the abdominal wound. It will be necessary to perform nephrectomy later, to save the patient the misery of a urinary fistula. Pozzi reports a case in which this plan was carried out.

It has already been mentioned that during the performance of ovariotomy the uterus may be gravid, and the operator, ignorant of the condition, may unguardedly plunge the trocar into the uterus.

Under such conditions, three courses are open to the surgeon :—(1) Enlarge the incision, empty the uterus, and stitch up the opening in the uterine wall; perform, in fact, Cæsarean section. (2) Pass a clamp or serre-nœud around the uterus, and remove it by what is known as Porro's operation (amputation of the gravid uterus). (3) Sew up the wound.

Each of these methods has been practised with success. Sir Spencer Wells‡ and Dr. Byford,§ of Chicago, have each reported a case in which the gravid uterus was punctured with the ovariotomy trocar, in mistake for an ovarian cyst.

* Thornton : *Med.-Chir. Trans.*, vol. lxx. p. 64, case 335.

† *Progrès Méd.*, April 11th, 1891 : "Proceedings of the French Congress of Surgery." *See also* Tait : *Diseases of Ovaries*, p. 282; 1883.

‡ *Medical Times and Gazette*, Sept. 30th, 1865.

§ *American Journal of Obstetrics*, vol. xii. p. 31.

In the case recorded by Sir Spencer Wells, this operator had removed a large adherent multilocular cyst of the left ovary, when he felt what was supposed to be a cyst of the right ovary. When tapped, it was found to be a gravid uterus. The pregnancy had advanced to near the fifth month. On discovering the mistake, Cæsarean section was at once performed. The patient recovered.

In Dr. Byford's case pregnancy had advanced to the seventh month. The ovarian cyst was removed in the usual manner. The trocar puncture in the uterus was enlarged, the fœtus and placenta removed, and the uterine wound closed by interrupted silk sutures. Before the wound was closed, the cervical canal was dilated with the finger. The patient—a single lady, aged twenty-three years, of unblemished character—recovered.

Hillas,* whilst operating on a single woman twenty-four years of age, wounded the gravid uterus whilst opening the peritoneum. On discovering the accident, he removed the ovarian cyst, emptied the uterus, and closed the uterine incisions with interrupted silver wire sutures. The patient recovered.

Dr. Fortescue,† whilst operating on an unmarried girl twenty-one years of age, found what were supposed to be two cysts. One was tapped and removed. On thrusting the trocar into the second tumour, it turned out to be a pregnant uterus. Porro's operation was performed, and the patient recovered.

The third method, of simply sewing up the puncture, has been practised by Lee.‡ It was a case in which an ovarian cyst complicated pregnancy in a woman twenty-

* *Australian Medical Journal*, 1875, p. 33.

† *Australian Medical Gazette*, May, 1884; *Med. Times and Gazette*, Nov. 8th, 1884.

‡ *American Journal of Obstetrics*, vol. xvi. pp. 286 and 942.

eight years of age. After the abdomen was opened and the cyst exposed, the patient was turned on her side, preparatory to puncturing the cyst. This movement displaced the cyst: the enlarged uterus rolled up to the incision, and was punctured with the trocar, instead of the cyst. The wound in the uterus was sewn up with carbolised silk sutures. The ovarian cyst was removed in the usual way, and the abdominal incision closed. The patient recovered, and left the hospital five weeks after the operation. Three days after her return home she presented symptoms of miscarriage. The cervix was dilated, and eventually the child was born. The mother made a perfect recovery.

Dr. Erskine Mason,* in performing ovariotomy on a single woman thirty years of age, punctured a gravid uterus. He closed the wound with sutures. Abortion occurred next day. The patient died in six hours.

Pollock† removed an ovarian cyst, and, mistaking the gravid uterus for another cyst, stabbed it with a trocar. Discovering his error, he closed the wound with a silver suture. The patient gave birth to a dead fœtus, of about the fifth month, a few hours after the operation, and died in two hours.

These cases seem to show that the best plan is to empty the uterus, dilate the cervix from the uterine cavity, and close the uterine incision, as after Cæsarean section.

Hæmorrhage.—Intermediate hæmorrhage may be due to the slipping of an ill-applied ligature, either upon the pedicle or on an adhesion. The pedicle may bleed, not from actual slipping of the ligature, but from its not being applied with sufficient firmness.

* *New York Pathological Society*, 1877, and *Am. Journal of Obstet.* vol. xii. p. 31.

† *Lancet*, 1862, vol. ii. p. 257.

Adhesions which merely feebly ooze when a patient is faint and collapsed will discharge a dangerous quantity of blood when reaction succeeds shock. Severe hæmorrhage is manifested by the well-known signs of internal bleeding, pallor, cold skin, rapid but feeble pulse, sighing respiration.

When these signs are manifested, the wound must be reopened, the clots turned out, and the bleeding point secured.

Hæmorrhage usually occurs within the first thirty-six hours. After enucleation has been practised, and the broad ligament ligatured, but not drained, bleeding may take place within it, and form a hæmatoma of the broad ligament. As a rule, it is slowly absorbed.

Peritonitis used to be a frequent cause of death. Its frequency has been diminished by improved methods of dealing with the pedicle, greater cleanliness, antiseptic and aseptic precautions, and the employment of irrigation, with or without drainage.

Peritonitis may arise from infection of the peritoneum at the time of the operation, in consequence of the escape of pus or other fluid from the interior of cysts or tumours; from sponges and instruments inadvertently left in the abdomen; from operations conducted in rooms in which sewer gas and similar deleterious agents are present; from damage to and subsequent sloughing of portions of the viscera, gangrene of the stump, pieces of adherent cyst wall, or adhesions; from decomposition of blood carelessly left in the pelvis, or that has oozed after the operation.

Its occurrence in a fatal form is not likely to be mistaken. The pulse is rapid, 120, 130, or 140, at first full and bounding, then quickly becoming thin and feeble. The temperature may be sub-normal, then slowly rise to 100°, 102°, or 103°. These signs, accompanied

by vomiting, the fluid being bile-stained or like black coffee, an anxious and pinched face, sunken eyes, and distended abdomen, form a picture never mistaken when once seen. Death is rarely long delayed.

Foreign bodies left in the abdomen.—Every writer on ovariotomy insists on the importance of exercising the utmost personal vigilance in counting *instruments*, and especially *sponges*, after an abdominal operation. Nearly all the cases in which foreign bodies are left in the abdomen die unless they are removed, and more than one writer has expressed the opinion that the accident has probably been overlooked where no *post mortem* was made.*

In several instances the surgeon has found the number of sponges or forceps short, and, failing to find them about the room, has re-opened the wound, and recovered the missing instrument or sponge.

Dr. Holland† has reported briefly the details of a case in which he removed two very adherent ovaries. Symptoms of hæmorrhage set in, and the wound was reopened. A few hours later the bleeding recurred, necessitating a third opening up of the wound. Subsequently a sponge was reported to be missing, and eventually the abdomen was opened again, but no sponge was found. Thus, in twenty-four hours this woman was etherised and her abdomen opened on four separate occasions. She recovered.

Dr. H. P. C. Wilson, of Baltimore, reported a case in which he left a sponge in the abdomen, after removing a large ovarian dermoid from a woman five months pregnant. Eighteen days after the operation the patient miscarried. An abscess afterwards formed near the

* Doran: *Gynæcological Operations.*
† *Brit. Gyn. Journal*, vol. vii. p. 179.

umbilicus, and five months after the operation the sponge was discharged piecemeal; the patient was subsequently restored to perfect health.*

This case induced him to collect from surgical literature, and from the personal reports of friends, twenty-eight cases in which foreign bodies had been left in the abdomen.

In a few cases a forceps was left behind, in the rest it was a sponge. This induced Dr. Wilson to believe that two-thirds of the cases never come to light, partly from the anxiety of the surgeon to conceal the matter, and partly from want of an autopsy.

This seems to be the only case as yet reported in which a patient has survived with a sponge left in the abdomen.

Olshausen† mentions a case in which a pressure forceps was passed by the rectum nine months after ovariotomy.

Nussbaum tells of a drainage-tube that remained two months in a patient's body, when a part of the wound opened after a dance, and the tube was at once pulled out by the patient. She suffered no further consequence.

Sir Spencer Wells on one occasion left a pair of forceps in the abdomen. The accident was suspected; some hours later the abdomen was re-opened, and the missing forceps found in a fold of omentum. The same surgeon reports that in a patient on whom he performed ovariotomy, he removed a pair of forceps from the bladder one month afterwards. The patient died.‡

A case is reported from Australia,§ in which a pair of

* Wilson: *Trans. Am. Obstet. Soc.*, 1884, vol. ix. p. 94.
† *Krankheiten der Ovarien*, s. 332, 1886.
‡ *Ovarian Tumours*, case 917, p. 336.
§ *Australian Med. Journal*, 1876, p. 327.

bull-dog forceps and a sponge were found in the abdominal cavity, after a fatal case of ovariotomy. This oversight, however, was not the cause of death.

Sponges are left in the abdomen far more frequently than the published records indicate.

Parotitis.—Inflammation of the parotid gland has been many times noticed during recovery from surgical procedures, especially after abdominal operations, and with exceptional frequency during convalescence from ovariotomy. The facts relating to this matter have been carefully formulated by Mr. Stephen Paget, in a paper communicated to the Medical Society, London, in which he analysed 101 cases of parotitis ensuing upon injury or disease of the abdomen and pelvis. Of these, 10 followed injury or disease of the urinary tract; 18 followed injury or disease of the alimentary canal; 23 injury or disease of the abdominal wall, sub-peritoneal or pelvic cellular tissue; and 50 injury, disease, or temporary derangement of the generative organs. Of the 50 cases consequent on injury, etc., to the generative organs, 27 followed ovariotomy or oöphorectomy.

The chief conclusions to which Mr. Paget arrived may be summarised thus:—

This form of parotitis has no period of incubation; it may occur on the first day after the primary lesion, or be delayed to the nineteenth.

It is rarely attended by much disturbance of the general condition of the patient; in the majority of cases there is a slight rise of temperature, and rarely rigors.

In a large proportion of the cases the gland suppurates; the affection runs no regular course: it may subside, recur, and subside again. Although it complicates pyæmia and septicæmia, it is most frequently independent of these conditions.*

* *Lancet*, 1887, vol. i. p. 214.

Tetanus.—This dread complication of wounds occasionally occurs after ovariotomy. In the experience of British surgeons it is very rare, but it appears, from the statements of Olshausen, to be much more frequent on the Continent.*

Doran significantly writes:—"This disease, rare as it is under the circumstances, is generally in itself sufficient to prevent a very long series of ovariotomies from showing 100 per cent. recoveries."

Insanity.—Attacks of *acute mania* during convalescence from, and subsequent to, ovariotomy, have been several times recorded. Mr. Barwell† communicated a case of this nature to the Clinical Society, London, under the title, *An Unusual Sequel to a Case of Ovariotomy*, the sequel referred to being an attack of mania. In the paper he refers to cases mentioned to him by Bantock, Dent, Thornton, and others. Since the publication of Barwell's case, many others have been recorded, which serve to show that acute mania may be regarded as one of the complications which follow this operation, even after rigid exclusion of transient attacks of delirium, due to absorption of carbolic acid employed in the operation.

The attacks of mania in nearly all cases quickly subsided; in a few instances the patient has remained insane for many months.

Vascular disturbances.—Thrombosis and embolism, with their usual sequences, occur after ovariotomy.

Thrombosis is due to the formation of clot in the veins of the pedicle. When ovariotomy is performed during pregnancy, or oöphorectomy for myoma, the veins of the pampiniform plexus and the uterine veins are usually exceedingly large vessels. After ligature,

* *Krankheiten der Ovarien*, p. 369. This author furnishes a table of 38 cases.

† *Clin. Trans., London*, vol. xviii. p. 199.

the blood in these veins may thrombose, and if the patient gets about too soon, the clotting may extend to the iliac veins, and even beyond, giving rise to symptoms identical with those seen in "phlegmasia alba dolens." After ovariotomy slight swelling of the leg may occur, but with continued rest in bed this soon subsides.

It is a good plan, when a patient has had transient attacks of œdema of one or both legs before the operation, to anticipate complication in this direction by keeping them strictly confined to bed at least a week longer than the usual time. As a rule, when such patients begin to move about, the œdema declares itself, unless they have had a long rest in bed.

Embolism.—Thornton* mentions the case of a woman aged twenty-three years, from whom he removed both ovaries for cystic disease. The patient was doing well up to the eleventh day. "She woke in the night, chatted and laughed with the nurse, and fell back dead." No necropsy was allowed.

Intestinal complications.—It has been already pointed out that ovarian cysts may cause intestinal obstruction, by pressing on the rectum or sigmoid flexure, by adhesion of the intestine to the cyst wall, or by actual strangulation of the gut by the pedicle.

After removal of the ovaries, whether for cystic conditions or inflammatory affections, the patient still runs some risk of this serious, and, as a rule, fatal complication.

It is difficult to estimate with any approach to accuracy the proportionate amount of risk; nevertheless, an examination of large lists of consecutive operations on the ovaries and Fallopian tubes will show that the danger is a real one.

* *Med.-Chir. Trans.*, vol. lxx. p. 55.

In a case of acute intestinal obstruction eight days after ovariotomy, Meredith* re-opened the abdomen, and relieved a piece of intestine which had become kinked, "in consequence of the traction exerted upon it by a piece of ligated omentum which was closely adherent to its surface." The patient recovered.

The obstruction may be acute or chronic: may supervene within a few days of the operation or be delayed months, or even years. The causes are various.

When intestine has been extensively adherent to an ovarian cyst, so that the serous surface becomes destroyed during the separation, such a surface quickly adheres to a neighbouring piece of gut; the adhesion may lead to the formation of a band, and this may strangle an adjacent coil of intestine.

The *pedicle* has been the source of danger; a piece of intestine or omentum may contract adhesions to it, and lead to fatal strangulation.

Adhesions of intestine and omentum to the abdominal cicatrix are by no means infrequent, and have been known to lead to fatal occlusion even six years after ovariotomy.†

This frequent union of intestine to the cicatrix must be borne in mind in performing abdominal section a second time on the same patient. On more than one occasion, ignorance of this fact has led to injury of the gut and subsequent fæcal fistula, with all the distress it causes.

Obstruction has been caused by a piece of intestine being included in one of the sutures applied to the abdominal wound.‡ This is an accident always to be guarded against in suturing the incision. Intestine has

* *Lancet*, April 3rd, 1886, p. 641.
† Shively: *New York Med. Journal*, vol. xl. p. 292.
‡ Doran: *Gynæcological Operations*, p. 264.

been included in the clamp, or compressed between the clamped pedicle and the abdominal wall. Hegar mentions a case in which an epiploic appendix was included in the ligature, and caused acute and fatal flexion of the intestine.

Perforation.—This accident may occur as a result of acute intestinal obstruction following ovariotomy. It may be occasioned by the end of a drainage-tube resting upon a piece of gut instead of the bottom of the recto-vaginal pouch. The prolonged pressure of the tube would lead to sloughing of the wall of the bowel. Should an abscess form around the pedicle, this may lead to adhesion and implication of an adjacent coil of bowel, and fæcal extravasation into the abscess. In fortunate cases this abscess will find a vent through the abdominal wound, and a temporary fæcal fistula will be the consequence. With the present excellent method of treating the pedicle, such complications are excessively rare. They occasionally occur as sequelæ to operations for advanced tubal pregnancy.

The risk of a fæcal fistula must be counted among the disadvantages attending the use of the drainage-tube.

Sir Spencer Wells* has given some cases in detail illustrating intestinal obstruction and fæcal fistula following ovariotomy which well repay perusal.

Ulceration of the intestine is a very unusual cause of death after ovariotomy.

Reference has already been made to an interesting case, reported by Doran, in which a woman twenty-six years of age died after the removal of an ovarian tumour. At the *post mortem* examination a perforating ulcer was found in the ileum. The pathological and clinical import of this case is discussed on page 131.

I have once had an opportunity of investigating a

* *Ovarian and Uterine Tumours*, p. 425; 1882.

case which occurred in the practice of a colleague in which a woman died after the removal of a small ovarian dermoid. The patient was thirty-three years of age, and three months pregnant with her sixth child. The operation was a simple one, and as the left ovary was cystic, it was also removed. Her symptoms after the operation were somewhat anomalous, and she died on the eighth day. At the *post mortem* examination several ulcers were found in the jejunum, one of which, situated six feet from the duodenum, had perforated, and caused fatal peritonitis. There had been no symptoms of obstruction at any time, or any evidence to lead to the supposition that there was disease of the intestine.

Repeated ovariotomy.—In a large number of cases patients have been twice submitted to ovariotomy. A knowledge of this fact always induces the surgeon, when performing ovariotomy, to examine carefully both ovaries, and when there is evidence of disease, to remove both glands. The second ovary must not be removed unless the surgeon feels very strongly that it is likely to give the patient trouble, for in very many cases women have become mothers after ovariotomy, and given birth to twins, and even triplets. This fact is sufficient to prohibit the removal of both ovaries as a constant practice in ovariotomy.

The records do not show that a second ovariotomy is attended with more than the usual risk of a first ovariotomy. It is necessary to remember that the abdominal incision must be cautiously made, because in very many instances intestine may be adherent to the cicatrix, and under conditions rendering it very liable to be wounded. It must also be remembered that the cicatrix is often very thin, and the knife entering the peritoneal cavity suddenly may do much mischief before the surgeon is aware of it.

It is recommended by some writers that in a second ovariotomy the opening may, with advantage, be made a little to one side of the original incision.

Cases have been reported in which patients have been three times submitted to ovariotomy; it is, of course, impossible that an ovarian cyst was removed on each occasion. That tumours were removed there can be no doubt, but it does not necessarily follow that they all originated in the ovary. The idea that the patient possessed three ovaries, each of which became cystic, is pure assumption.*

The fate of the ligature.—When a ligature is satisfactorily applied to a pedicle, it is clear that the tissue on the distal side of the ligature is isolated from the circulation. The fate of this tissue, and of the ligature, has been made the subject of much speculation.

It is a matter of common observation that when animal tissues are cut off from the circulation, they atrophy and shrivel. When micro-organisms gain access to such parts, fermentation and decomposition ensue. In due course, through the activity of leucocytes, the dead tissues are detached from the living—a process termed in surgery sloughing.

When a piece of tissue is removed from a living body, and immersed in a sterilised solution, and absolutely isolated from the atmosphere, decomposition will be postponed in it for an indefinite time, but as soon as unsterilised air is allowed access to it, putrefaction at once ensues.

The pedicle, after an ordinary ovariotomy, is in an air-tight cavity; the tissues included in the ligature are healthy, hence, when such a pedicle is returned to the abdomen, it resembles the piece of tissue removed from contact with the atmosphere. No fermentative changes

* Buchanan: *Brit. Med. Journal*, 1891, vol. ii. p. 118, and p. 336.

occur, but aggressive leucocytes attack and gradually digest the ligature, and in course of time effect its removal.

In order that a piece of silk, gut, tendon, or whip-cord applied to a pedicle shall be retained until digested, two conditions must be fulfilled: the ligatured tissue must be healthy, and air must be excluded.

It has been established that after simple ovariotomy the pedicle rarely sloughs, but it is quite certain that when ovaries and Fallopian tubes are removed for inflammatory diseases, such as pyosalpinx, the pedicle is often a source of disaster. In many operations in which drainage is resorted to, the pedicle is apt to slough and give rise to a sinus, through which the ligature is ultimately discharged.

Many surgeons refuse to believe that the ligature causes trouble; this is idle. In several instances it has formed the nucleus of a vesical calculus; it has been discharged through the rectum, and in many patients it has, months after the operation, escaped through a sinus in the parietal cicatrix. When the pedicle sloughs soon after the operation, and before adhesions isolate it from the general peritoneal cavity, it may cause fatal peritonitis.

Two things cause trouble in the pedicle; the structures composing it are the Fallopian tube, ovarian ligament, and blood-vessels included between the layers of the peritoneum forming the mesosalpinx. When that portion of the tube included in the ligature is the seat of septic changes, it must necessarily endanger the safety of the pedicle, and cause it to slough, or set up inflammatory changes around the ligature, which not infrequently nullify the good effects of the operation.

It must also be pointed out that one of the disadvantages of drainage is that it admits air into the peritoneal cavity, so that if a pedicle contain septic elements, the admission of air will serve to establish decomposition,

and in a certain proportion of cases induce separation of the ligature.

An inquiry into this question shows that after simple ovariotomy or oöphorectomy for myomata, a properly tied pedicle rarely causes trouble, but when oöphorectomy is performed for the condition known as pyosalpinx, the ligature is a source of irritation, and in a fair proportion of cases causes abscess; this is more likely to happen when drainage has been necessary. The local suppuration may lead to general peritonitis, or the pus may escape through the rectum, bladder, or abdominal wall.

Absorption of the ligature, when silk is used, takes place slowly. In one patient, whose abdomen was reopened one year after double oöphorectomy, I found the *knots* only of the silk used for the pedicles. In another instance in which I performed hysterectomy, three years after double oöphorectomy, no traces of five silk ligatures applied in the original operation were detected, after a most rigorous search.

Historical.

1809. Ephraim McDowell, Kentucky, performed the first ovariotomy. He tied the pedicle, but left the ligature hanging out of the wound. (The patient survived the operation 32 years. —LAWSON TAIT.)

1821. Nathan Smith, New England, tied the vessels in the pedicle with strips of a kid-glove, and returned it into the abdomen.

1850. Hutchinson introduced the clamp.

1864. Baker Brown introduced the cautery. Lawson Tait also gives this surgeon the credit of re-introducing and establishing the intra-peritoneal method of dealing with the pedicle which has led to such brilliant results. Doran ascribes it to the systematic advocacy of Dr. Tyler Smith.

Those interested in this subject should read Doran's paper in *The St. Barth. Hosp. Reports*, 1877, vol. xiii. p. 195.

Lawson Tait, *Diseases of the Ovaries*, 1883, pp. 238 and 286.

Dr. Stansbury Sutton, *Trans. Am. Gyn. Soc.*, vol. vii. p. 119.

CHAPTER XLII.

THE EFFECTS OF THE REMOVAL OF THE OVARIES ON THE SECONDARY SEXUAL CHARACTERS OF WOMEN.*

In the opening chapter of this book the primary and secondary sexual characters of the human family were briefly considered. The behaviour of these characters after removal of the genital glands in women has not been dealt with in an impartial way, and the consequence is that few opinions in the profession of medicine rest upon such unsatisfactory evidence as those relating to the effects of double ovariotomy, or oöphorectomy, on the secondary sexual characters. It is imagined by many that after removal of the ovaries women become hairy about the face, the mammæ atrophy, and they, in short, assume many of the secondary sexual characters of the male.

This error may be traced to two sources. One is the assumption that certain changes observed in birds and deer after injury to, or disease of, the sexual glands holds good in men and women; the other source of error is the oft-quoted case reported by Percival Pott.† In this case a robust and healthy woman, twenty-three years of age, suffered so much inconvenience from a swelling in each groin, that after due consideration they were removed. The bodies excised from these swellings were regarded as ovaries, but they were not examined microscopically. The concluding paragraph of Pott's brief account of the

* *International Clinics*, vol. ii. p. 216; 1891.
† *Chirurgical Works*, case xxiv. p. 791; 1775.

case is this:—"She has enjoyed good health ever since, but is become thinner and more apparently muscular; her breasts, which were large, are gone; nor has she ever menstruated since the operation, which is now some years."

This is a typical example of the flimsy evidence on which text-book writers rely. In this case there are only two facts stated with any approach to certainty: these are (1) the woman ceased to menstruate; (2) years afterwards her breasts were gone. It must be remembered we have no proof that the bodies removed from the groins were ovaries. In some instances when organs supposed to be ovaries have been removed from the inguinal canals, the microscope has shown them to be testes. Dr. Chambers's well-known case is an instance of this, and I have seen two others. The only evidence in Pott's case that the bodies were ovaries is the statement that she menstruated regularly before the operation. I know of no case in which menstruation co-existed with testes, but well-developed mammæ may be associated with testes, as in Chambers's celebrated case (*see* page 25); and it is a curious fact that in this instance it is reported a month after the operation: "The left breast has almost disappeared, while the right remains the same as before the operation." Pott's case no more proves that the removal of the ovaries will lead to the atrophy of the mammæ and the assumption of secondary sexual characters than that the existence of antlers in a doe roe-deer indicates sterility. As antlered does are instructive in relation to this question, it will be useful to very briefly mention a few facts in this direction.

Female deer are occasionally seen with antlers, which resemble very closely the stunted specimens seen on the heads of castrated bucks. It is believed by many that such specimens are very frequent, but an inquiry into the matter shows that this is not the case. That female deer

put up antlers occasionally is beyond doubt. One of the most accessible specimens is preserved in the museum of the Royal College of Surgeons, London. It is the skull of a doe roe-deer; it was shot by the Earl of Egremont, near Petworth, Surrey, in 1810, and presented by him to the museum. The antlers, to judge from the specimen, were covered with "velvet." One is a simple curved snag nearly eight cm. in length, with a well-developed burr; the other is a mushroom-shaped burr without any beam. Lord Egremont, in a letter, expressly stated that the deer was *a very old and uncommonly large female, with two young ones in her.* The pregnant condition of this animal must not be regarded as very unusual. In Germany, where roe-deer are more plentiful than in Great Britain, many does with antlers have been seen; Dr. Altum has observed no fewer than forty instances. Most of these were barren animals, and the antlers were always of a more or less abortive character, except one case, in which the normal male form was well reproduced; *several were fertile*, and were either with young when killed or had recently given birth to fawns. Such abnormal antlers appear to be persistent, and permanently covered with velvet.

It has been difficult to obtain precise information as to the actual condition of the reproductive organs in these antlered females, and the statement that they were mostly barren, though significant, is not sufficiently precise for our purpose. In 1791 Hoy briefly communicated to the Linnean Society a few facts about a *one-horned hind.* It was a hind, the female of *Cervus elephas*, shot by the Duke of Gordon, "which had one horn perfectly similar to that of a stag three years old. It never had a horn on the other side of the head, for there the corresponding place was covered over by the skin, and quite smooth. It does not seem to have ever produced a fawn, and upon

dissection, the ovarium *of the same side with the horn was found to be scirrhous.*" * We have authentic evidence of the occurrence of antlers in female deer in the following

Fig. 119.—Head of a Doe (*Capreolus capræa*) with Antlers.
It is beset with exostoses, and is velvet-covered.

species: Roe-deer (Fig. 119), Virginian deer, Moose, and Red-deer; antlered females in other *Cervidæ* seem to be of very rare occurrence.

Thus the evidence shows that the presence of antlers on a doe is no proof of sterility any more than a slight growth of hair on the lips and chin of a woman indicates barrenness, for most of us could adduce instances of

* *Transactions*, vol. ii. p. 356.

women the unfortunate possessors of a growth of hair on the lip, but mothers nevertheless.

I have made many personal inquiries into this matter, and sought far and wide in special writings for evidence in support of the statement that removal of the ovaries tends to cause abnormal growth of hair. The following are characteristic examples of the evidence :—Olshausen* refers to a case mentioned by W. Atlee in which a woman, after excision of both ovaries, developed a beard fourteen years after the operation. The patient was then fifty years of age. Peaslee mentions three cases in which women with ovarian trouble had tolerable beards. He did not follow up the cases.

Statements of this kind must not be accepted as evidence that the appearance of the beard depended on the removal of the ovaries. Indeed, evidence can be quoted in the opposite direction. Clement Lucas† communicated to the Clinical Society, London, a case of early puberty in a girl seven years of age, from whom he removed an ovarian tumour. The external genitals were precociously developed, there was considerable growth of hair on the pubes, enlarged mammæ, and menstruation. After the operation, these signs for the most part reverted to their normal state : before she left the hospital the prominence of the mammæ had much subsided. In contrast to this, Olshausen reports that he removed a large proliferating ovarian cyst from a girl of sixteen years who had not menstruated. In bodily conformation she resembled a girl of ten or twelve years.

Mr. Thornton and Dr. Myrtle‡ have recorded the details of a very unusual case, in which abdominal nephrectomy was performed for a large sarcoma of the

* *Die Krankheiten der Ovarien*, p. 379; 1886.
† *Trans. Clin. Society*, vol. xxi. p. 224.
‡ *Trans. Clin. Society*, vol. xxiii. p. 150.

left supra-renal capsule by Mr. Thornton. He writes :—"The patient, who was a married lady of thirty-six, mother of one child, aged thirteen, had another curious pathological condition, which had developed soon after the oöphorectomy performed by Dr. Keith six or seven years before I saw her. She was covered all over with long silky black hair, and had to shave her face just like a hairy man." Dr. Myrtle writes :—"Here I may remark that the mammæ had disappeared, and that her cheeks, upper lip, and chin were covered with soft darkish down, such as you see on a lad of eighteen or nineteen, and that the arms and fore-arms were also hairy.'

We must not hasten to attribute these changes to the removal of the ovaries.

The supposed sarcoma of the supra-renal capsule was removed in April, 1889; in November of the same year she wrote to Dr. Myrtle: "I am much like my old self, and have all the external appearances of other women."

The facts of this case indicate that the irritation of the sarcoma had more to do with the growth of hair than the oöphorectomy.

Let me now consider the effects of complete removal of both ovaries upon menstruation. This is an important subject, because surgeons occasionally remove both ovaries for the purpose of anticipating the menopause in some cases of uterine myomata.

In 1859, Farre,* in his classical article *Uterus*, expressed the following opinion relative to the influence of the ovaries on menstruation:—"Their artificial removal is followed by a permanent cessation of the catamenial flow, although the uterus may be left uninjured." A critical analysis of the evidence adduced by subsequent writers in opposition to this opinion has served to convince me

* Todd's *Cyclopædia*; Supplement.

that Farre was absolutely correct. It is beyond all dispute that some women, after both ovaries and tubes have been completely removed, suffer from discharges of blood from the vagina; but vaginal hæmorrhage of any kind does not constitute menstruation.

Before discussing these irregular hæmorrhages, it must be mentioned that the Fallopian tubes exercise no influence on menstruation, and in order to produce artificial amenorrhœa both ovaries must be completely removed. Let me mention a few facts that will show that the tubes exercise no influence.

The museum of the Royal College of Surgeons contains two large specimens, described in the catalogue as dilated Fallopian tubes.* On one of them there is a fragment of ovary; no trace of the ovary can be detected on the other. Sir Spencer Wells, who removed them from a woman twenty-three years of age, reports "that menstruation has continued regularly since the operation."

In 1890 I attempted to perform double oöphorectomy in a woman with a large and rapidly-growing uterine myoma. The right ovary and tube were easily removed. The left ovary could not be found, but the left tube was clearly and completely removed: the woman menstruates as regularly as before the operation. In December, 1890, I attempted to remove the ovaries and tubes in a case of very large myoma. The right were removed easily, but the left tube and ovary were so embedded in the tumour as to make their removal impossible. I ligatured the tube firmly with two stout gut ligatures. The patient has not missed a period since the operation.

In 1890 Dr. Champneys† performed Cæsarean section

* I believe them to be really dilated horns of a bi-cornuate uterus.

† *Trans. Obstet. Soc.*, vol. xxxi. p. 136.

on a dwarf, and in order to prevent fecundation he ingeniously ligatured each tube with a piece of kangaroo tendon. Dr. Champneys in a letter informs me that the woman has menstruated regularly since the operation.

We have now to discuss the cases in which so-called menstruation continues after removal of both ovaries and tubes. In a few of the reported cases menstruation appears for one, two, or three periods, then ceases for ever. In others, the patients have amenorrhœa for a few months, then menstruate for a few periods before the flow permanently ceases.

In many cases of double ovariotomy or oöphorectomy blood issues from the vagina within forty-eight hours of the operation, and sometimes lasts two days.

These irregularities cannot be advanced seriously as persistence of menstruation after removal of ovaries or tubes. The same irregularity is reported by women at the climacteric period.

The cases we have seriously to discuss are those in which after removal, or supposed removal, of both ovaries menstruation has persisted.

Mr. Thornton* attempts to explain this by assuming the existence of a *third ovary*. This explanation must not be entertained. *There is no authentic instance on record of a third ovary*. Specimens reported as supernumerary ovaries are usually instances of deeply-fissured ovaries. Several cases of supposed third ovaries lack histological demonstration, without which they cannot be received as evidence. This question was discussed in chapter iii.

It is an important fact that the reported cases of persistent menstruation after removal of both ovaries have usually been patients in which the operation has

* Heath's *Dictionary of Surgery:* article "Oöphorectomy."

been performed for chronic inflammatory affections of the tubes and ovaries, or for uterine myoma.

The supposed persistence of menstruation after removal of both ovaries is capable of explanation in two directions:—

1. In some cases it is due to imperfect removal of the ovaries. They may be so adherent to surrounding parts that it is impossible to be quite sure no ovarian tissue is left.

   In uterine myoma the ovary is sometimes elongated like a cord, and a portion of the gland may easily be left on the proximal side of the ligature, without the surgeon being aware of it.

2. The persistent hæmorrhage in patients from whom both ovaries have been completely removed in order to check profuse bleeding, due to myoma, is not infrequently caused by the presence of a submucous tumour that has been overlooked.

In several such cases it has been necessary to dilate the uterus when the presence of such a tumour has been suspected. Its removal at once checks the supposed menstruation. Operators are rarely frank enough to record such cases.

Irregular hæmorrhage from the vagina simulating menstruation after complete oöphorectomy is in some cases due to the irritation of the ligatures used for the pedicle. This subject requires extended investigation.

Dr. Howard A. Kelly* in a short paper on *The more remote results of removing the ovaries and tubes*, writes that

* *The John Hopkins Hospital Bulletin*, Baltimore, May 1st, 1890, p. 57.

he has "several times seen *severe hæmorrhages* a year or two after operation." In 1888 he removed two tubo-ovarian abscesses; the patient had a slow convalescence, but finally recovered complete health. Subsequently she suffered from periodical uterine hæmorrhage. Dr. Kelly discovered a mass about an inch and a half in diameter at the right uterine cornu, which he regarded as an old ligature encapsuled. He performed abdominal section, removed a serous cyst apparently within the folds of the broad ligament, and in it found the silk ligature. There was no trace of ovary on either side.

He said he could recall five such cases. It must also be borne in mind that the patients ignorantly mistake the source of hæmorrhage. On one occasion I removed both ovaries and tubes for early tubal gestation. The patient assured me that she menstruated as regularly as before the operation; for nearly two years I believed her. It then occurred to me to verify the patient's statement. To my surprise, I found the source of the supposed menstruation to be internal piles. These I removed: a proceeding which immediately stopped the hæmorrhage.

In a discussion* on persistent menstruation after double ovariotomy at the Obstetrical Society of New York, October 19, 1886, Dr. Mundé "recalled an oöphorectomy which he had seen Dr. Noeggerath perform. The operation was done for the relief of dysmenorrhœa. The patient continued to menstruate for a year after her recovery, and the dysmenorrhœa and other abdominal pains persisted. Her abdomen was reopened, the intestines, which were found adherent to the cicatrix, were lifted out of the pelvis, the stumps of the removed ovaries and the surrounding adhesions

* *Am. Journal of Obstet.*, vol. xix. p. 1263.

were cut off and then thoroughly cauterised; yet after this second laparotomy the patient continued to menstruate just the same as before. Four years later she entered the President's [Dr. Mundé's] service at Mount Sinai Hospital, this time *with a well-marked uterine fibroid*, which he was sure had not existed at the last operation. Her periods still recurred regularly." She refused further interference, and was lost sight of.

Vaso-motor disturbances.—The most frequent and troublesome form of nerve-disturbance that is liable to arise after removal of both ovaries and tubes is the peculiar phenomenon commonly termed "the flushes."

Campbell,* in his interesting work, defines a flush as *a nerve-storm, in which a rush of blood to the skin and a sense of heat are generally the most obtrusive manifestations.*

He then goes on to state that in a fully-developed flush the patient at first feels hot, some portion of the skin being flushed with blood; immediately after, or in a very short time, sweating occurs; finally, while the sweat is still on, or while it is diminishing, or after it has actually disappeared, the patient feels cold or may shiver.

It is not my intention to enter into the physiological side of the question; those who desire to do so should carefully study Campbell's book. My intention is merely to consider "flushing" as a sequel to the removal of the ovaries. It is well-known that as women approach the menopause they are especially liable to "heats" or "flushes." When menstruation finally ceases, flushes may recur so frequently as to cause the patient much distress.

In the course of two years they so diminish in

* *Flushing and Morbid Blushing*, London, 1890.

frequency and force that the individual is no longer distressed by them.

When the menopause is suddenly brought about by the removal of the ovaries, these flushes begin to manifest themselves, and in some patients they are very distressing. I have made many observations on such cases, and find it impossible to foretell before the operation whether a given patient will suffer from flushes or not.

I find that the phenomenon ensues upon the operation quicker in women who are near the menopause; it lasts longer, is more frequent and pronounced in them than in younger women. It seems to follow equally after double ovariotomy, oöphorectomy for inflammatory conditions and for myoma. In one patient the flushing began three days after the operation; in most cases it is delayed some months, and in a few the flushes are not frequent until a year has elapsed.

In one patient the flushes recurred ten times an hour, and this went on for several months. In women between twenty and thirty the flush is, as a rule, very mild even when frequent.

My observations induce me to believe that they are more severe after hysterectomy in women between the fortieth and fiftieth years. After this operation there is another very remarkable condition which other surgeons must have observed; it is this:—On comparing a number of temperature charts, it will be seen that in many there will be found a very sudden rise of temperature; sometimes it will reach as high as 105°, usually it is 103° or 104°. When this occurs, the surgeons may feel that something is wrong with the patient, yet she will appear comfortable, and her general condition is not consonant with the temperature record. When this is the case, a cautious inquiry will show that the

day on which the temperature rose, according to the patient's reckoning, would be the date on which she would in the ordinary way expect to menstruate. I have tested this often in my patients and in those of other surgeons. Knowledge of this fact has on several occasions spared me much anxiety.

With regard to treatment, I know of no drugs which have any effect in preventing or in any way diminishing the force and frequency of the flushes. I have tried many, but now adopt no form of treatment, but endeavour to comfort the patients by the assurance that the vaso-motor storms will slowly diminish, until they cease to be even inconvenient.

The influence of the removal of both ovaries from a sexually mature woman upon the sexual appetite and nubility I do not propose to consider. This question has been discussed by other writers.

The subject matter of this chapter may be summarised thus:—

1. There is no evidence that double ovariotomy and oöphorectomy lead to any unusual development of the secondary sexual characters.
2. There is no evidence that such operations induce atrophy of the breast, but they may cause obesity in women who have a tendency to form fat.
3. With extremely rare exceptions, menstruation is permanently arrested: irregular hæmorrhages may follow the operation, due to irritation caused by ligatures, submucous tumours, or other uterine disease. Such must not be confounded with menstruation.
4. In most, the sexual appetite is unaffected, in a few destroyed, but in many it is restored.
5. A *third* ovary has yet to be demonstrated.

6. A careful study of the question leads me to subscribe to the opinion of Tissier* that, "*Le cas ancien de Pott, où la castration fut suivre de modifications de l'habitus extérieure, de la voix, du volume des seins, est resté presque isolé.*"

* Delbet: *Des Suppurations pelviennes chez la Femme*, p. 338; Paris, 1891.

INDEX TO NAMES.

A

Altormyan, 185
Anderson, 121
Atlee, 221, 479
Aveling, 208

B

Bagot, 74
Ballantyne, 229, 274
Bantock, 59, 65, 176, 196, 205
Barnes, Robert, 29, 156, 170, 291, 348, 370, 375
Beaumont, 155
Beck, 159
Beigel, 22
Blackman, 130
Bouchard, 279
Bozeman, 380
Bright, 155, 170
Brodie, Sir B., 130
——, G., 267
Brown, Baker, 474
Bryant, 185
Byford, 461

C

Campbell, 485
Carter, 76, 196
Chahbazain, 402
Chambers, 25, 476
Champneys, 37, 346, 424, 481
Clegg, 403
Coblenz, 94
Collins, Treacher, 76
Cooke, 364
Copeman, 20
Coupland, 79
Croom, H., 137
Cullingworth, 67, 75, 83, 188, 222

D

Daly, 402
Darwin, 4
Delbet, 292
Dezeimeris, 324
Doleris, 284
Doran, 17, 23, 33, 71, 84, 98, 127, 131, 160, 261, 280, 350, 474
Dreschfeld, 75
Duncan, Matthews, 15, 35, 69, 153, 167, 204, 383

E

Edwards, 136
Emmet, 197
Ercolani, 390
Ewens, 68

F

Fagge, 161
Farre, 10, 13, 225, 480
Fetherston, 196
Fleming, 391
Fortescue, 461
Fowler, 249, 261
Franck, 25

Freeman, 47, 295
Freund, 186

G

Galabin, 25, 200, 365
Gervis, 377
Godson, 298, 413
Goodall-Copestake, 196
Goodell, 222, 365
Goodhart, 29
Gooding, 197
Goupil, 329, 399
Gray, 66
Griffith, 111, 119, 211, 277
Grigg, 292

H

Hamilton, 392
Hart, 337
Henry, 161
Herman, 131, 320, 367, 401, 426
Hicks, 348, 367
Hillas, 461
Holland, 464
Hudson, 81
Hulke, 28, 80
Hurry, 298
Hutchinson, 387, 474
Hyrth, 307

J

Jessop, 90, 345
Jones, 17

K

Keith, S., 258, 415
——, T., 216, 222, 305, 441, 458
Kelly, 483
Kidd, 272
Klob, 135
Koeberlé, 92
Kolaczek, 70
Kussmaul, 354

L

Langton, 27
Lee, 461
——, T. Safford, 152, 171
Leon, Mendes de, 196
Lepine, 279
Lewers, 261
Lizars, 171
Lucas, 479
Luschka, 357

M

Macdonald, 362
Mackenzie, 19
Manser, 131
Martineau, 152
Mason, 462
McClintock, 174
McDowell, 474
Mead, 152
Meredith, 150, 194, 305, 469
Metschnikoff, 243
Moore, 69
——, Milner, 192
Morris, H., 158, 192, 256
Moxon, 193
Mundé, 57, 161, 484
Murchison, 154
Murray, 144
Myrtle, 480

N

Noeggerath, 484
Neumann, 66

O

Olshausen, 22, 153, 465, 479

P

Page, 198
Paget, Sir J., 300
——, Stephen, 466
Parry, 14, 325, 335, 366, 370
Patenko, 16
Peaslee, 479
Playfair, 305
Pollock, 462
Popow, 14
Pott, 475
Potter, 69
Poupinel, 49
Pozzi, 460

R

Rasch, 195
Reeves, 53, 73, 175
Ricard, 161
Richard, 111, 224
Ritchie, 14
Robinson, 117
Rokitansky, 15, 135, 193
Roper, 403
Routh, 362
Rowan, 370
Ruffer, 243

S

Sale, 364
Sänger, 203
Schneidemühl, 118
Shattock, 58, 67, 77
Sheild, 342
Silcock, 272
Simmonds, 387
Simpson, 286, 360
Sippel, 219
Smith, Greig, 140
——, H., 29
——, Nathan, 474
——, Tyler, 367
Spaeth, 286
Stevenson, 414
Stewart, 375
Stonham, 25, 378
Sutton, Stansbury, 474

T

Tait, Lawson, 13, 135, 145, 167, 194, 325, 344, 368, 397, 474
Taylor, 72, 347
Thornton, 67, 126, 135, 139, 158, 415, 468, 480
Tissier, 487
Treves, 158
Turner, 357

V

Veit, 258
Velits, 61
Virchow, 357
Vocke, 291

W

Walter, 108, 113, 281
Ward, O., 217
Wells, Sir S., 74, 137, 144, 159, 172, 194, 204, 246, 305, 460, 465, 470

Wheaton, 275
Wilks, 193
Williams, 229, 274
Williams, J., 6, 25, 71, 201, 415
Wilson, 365, 464
Wiltshire, 144, 156
Winckel, 22, 83
Worrall, 379

Y

Yarrow, 178

Z

Zemann, 278

INDEX TO SUBJECTS.

A

Abortion, tubal, 326
Abscess of ovary, 276
,, of pedicle, 474
,, tubo-ovarian, 251, 260
Absence of ovary, 22
Accessory fimbriæ, 227
,, ostia, 225
,, ovaries, 22
Actinomycosis of the tube, 278
Adenoma of the cervix uteri, 265
,, ,, ,, in monkeys, 267
,, of the ovaries, 52
Adhesions, 132
,, treatment of, 433
,, of vermiform appendix, 127
Aggressive cells, 243
Air in ovarian cysts, 154
Allantoic cysts, 209
Amœbic warfare, 243
Antlered does, 478
Apoplexy of the ovary, 16
Atrophy of the ovary, 33
Axial rotation, 135
,, ,, of a hydrosalpinx, 256
,, ,, of ovarian cysts, 135
,, ,, of parovarian cysts, 108

B

Bladder, distended, 199
,, forceps in, after ovariotomy, 465
,, injury to, in ovariotomy, 459
,, relations of, 42
Blushing, morbid, 485
Broad ligament, anatomy of, 36
,, ,, hydatids of, 186
,, ,, tumours of, 203

C

Cancer and pyosalpinx, 249
Carcinoma of the ovary, 76
,, ,, primary, 76
,, ,, secondary, 79

Cave of Retzius, 38, 211
Children, extra-uterine, 423
Cicatrix after ovariotomy, 445
Colloidknittern, 153
Concretions in the ovary, 19
Corpora fibrosa, 16
Corpus luteum, 14
,, ,, cysts of, 15
Cysts, allantoic, 209
,, dermoid, 57
,, hydatid, 183
,, oöphoritic, 45
,, papillomatous, 95
,, paroöphoritic, 93
,, parovarian, 104
,, renal, 190
,, urachus, 209.

D

Decidua, menstrual, 336
,, in tubal pregnancy, 335
,, uterine, 336
Dermoids, ovarian, 57
,, bone in, 58
,, glands of, 58
,, hair of, 57
,, horn in, 61
,, in infants, 89
,, mammæ in, 58
,, metastasis in, 70
,, mucous membrane in, 48
,, muscle-fibre in, 58
,, nerves in, 64
,, suppurating, 131
,, teeth in, 63
Diagnosis of ovarian tumours, 163
,, of salpingitis, 289
,, of tubal pregnancy, 397
Double-fused ovarian cysts, 148, 434, 437
Drainage, 454
,, advantages of, 458
,, disadvantages of, 457
,, indications for, 457
,, mode of carrying out, 455
,, tubes, 455
,, ,, Keith's, 455
,, ,, Koeberlé's, 455

E

Epithelial pearls, 63
Epithelium in oöphoritic cysts, 50
,, in parovarian cysts, 110
,, in tubal disease, 309
Erosion of os uteri in monkeys, 268
,, ,, in women, 266

F

Fallopian tube, anatomy of, 223
,, adenoma of, 280
,, cancer of, 287
,, glands of, 230
,, gumma of, 279
,, inflammation of, 235. (*See* Salpingitis.)

Fallopian tube, myoma of, 286
,, mucous membrane of, 229
,, ostium of, 224
,, papilloma of, 280
,, tuberculosis of, 272
Fibroma of the ovary, 71
Flushes, 485
Flushing the peritoneum, 452 (*See* Irrigation.)
Fœtus, macerated, 376, 426
,, mummified, 344, 372
,, retained, 372
,, ,, in cat, 392
,, ,, in cow, 385
,, ,, in ewe, 388
,, ,, in guinea-pig, 391
,, ,, in hare, 387
,, ,, in jackal, 393
Foreign bodies left in abdomen, 464

G

Gestation, abdominal, 344
,, broad ligament, 324
,, cornual, 354
,, ovarian, 332
,, peritoneal, 344
,, tubo-uterine, 349

H

Hæmatocele, 399
,, ovarian, 332
Hæmatoma, 317
Hæmatosalpinx, 262
Hernia of the ovary, 24
,, ,, treatment of, 303
Hydatid cysts, 183
,, ,, of the broad ligament, 186
,, ,, of the liver, 185
,, ,, of the mesentery, 196
,, ,, of the omentum, 196
,, ,, of the ovary, 184
,, ,, of the uterus, 185
,, fremitus, 183
,, of Morgagni, 227
Hydramnios, 174
Hydrocele, ovarian, 111, 260
,, ,, in guinea-pig, 119
,, ,, intermitting, 121
,, ,, in mare, 118
,, ,, in women, 111, 120
Hydrometra, 182, 247
,, in ewe, 247
,, in women, 246
Hydronephrosis and ovarian cysts, 190
,, intermitting, 192
Hydroperitoneum in tubal disease, 261
Hydrops tubæ profluens, 121
Hydrosalpinx, 252, 259
,, causes of, 256
,, intermitting, 258
,, rotation of, 257

I

Infundibulum, 223
Intestinal obstruction from ovarian cysts, 161

Intestinal obstruction after ovariotomy, 468
Irrigation, 452
,, indications for, 452
,, method of, 452

K

Kidney, congenital cystic, 190
,, in hollow of sacrum, 191
,, movable, 190

L

Ligament, broad, 36
,, round, 38
,, tubo-ovarian, 224
,, utero-sacral, 39
Ligature, absorption of, 474
,, fate of, 472
,, history, 474
,, mode of applying, 434
Lithopædion, 373

M

Macaques, menstruation in, 7, 267
Macrophages, 243
Menopause, artificial, 447
Menstruation, 5
,, in monkeys, 7
,, in women, 5
Mesometrium. (*See* Broad ligament.)
Mesosalpinx, 38
,, crumpling of, 240
,, infiltration of, 240
,, obliteration of, 238
Metrostaxis, 444
Micro-organisms, 243
Microphages, 243
Moles, tubal, 314
,, uterine, 315
Monkeys, adenoma of cervix in, 269
,, leucorrhœa in, 270
,, menstruation in, 7, 267
Morgagni, hydatid of, 227
Myoma of broad ligament, 203
,, of ovarian ligament, 209
,, of ovary, 72
,, of round ligament, 203
,, of uterus, 179

N

Nerves in dermoids, 65
Nerve-storms, 485
Neurotic affections, operations for, 304

O

Œstrus, 10
Oöphorectomy, 447
,, mode of performing, 448
,, mortality of, 305
Oöphoromata, 91
Oöphoron, definition of, 44
,, cysts of, 45
Ostium, accessory, 225
,, occlusion of, 236
,, ,, in tubal pregnancy, 312
,, tubal, 224
Ovarian cysts, diagnosis, 163
,, from ascites, 166
,, from broad ligament tumours, 205

Ovarian cysts from chyle-cysts, 195
,, from distended bladder, 199
,, from fæcal accumulations, 199
,, from fatty tumours, 194
,, from gall-bladder, 194
,, from hydatid cysts, 196
,, from hydramnios, 174
,, from hydrometra, 182
,, from hydronephrosis, 158
,, from liver, enlarged, 195
,, from mesenteric tumours, 196
,, from myoma of broad ligament, 203
,, from myoma of round ligament, 203
,, from myoma of uterus, 179
,, from obesity, 200
,, from omental cysts, 196
,, from omental hydatids, 196
,, from pancreatic cysts, 194
,, from pelvic cellulitis, 210
Ovarian cysts from pericæcal abscess, 213
,, from peritonitis, tubercular, 167
,, from phantom tumour, 170
,, from physometra, 178
,, from pregnancy, tubal, 412, 414
,, from pregnancy, uterine, 172
,, from post-rectal dermoids, 198
,, from sacral tumours, 197
,, from serous perimetritis, 201
,, from spina bifida, 197
,, from spleen, 193
,, adhesions of, 132, 433
,, air in, 154
,, detachment of, 140
,, diagnosis of, 163
,, inflammation of, 123
,, intestinal obstruction from, 161
,, leakage from, 147
,, necrosis of, 138
,, pressure effects, 147
,, rotation of, 135
,, rupture of, 147
,, suppuration of, 128

Ovarian cysts, torsion of, 135
,, treatment of, 214
,, varieties of, 44
Ovarian gestation, 332
,, hæmatocele, 332
,, hydrocele in guinea-pig, 119
,, ,, in the mare, 118
,, ,, in women, 111
Ovarian mammæ, 58
,, ,, areola of, 58
,, ,, nipples of, 59
,, ,, structure of, 61
,, pseudo-mammæ, 58
Ovarian sac in baboons, 116
,, in hyæna, 115
,, in porcupine, 117
,, in rats and mice, 115
,, in women, 114
Ovarian teeth, 63
,, development of, 63
,, nerves in, 64
,, structure of, 65
,, varieties of, 63
Ovaries, abscess of, 276
,, absence of, 22
,, accessory, 22
,, apoplexy of, 16
,, atrophy of, 33
,, cancer of, 76
,, concretions in, 19
,, dermoids of, 57
,, fibroma, 71
Ovaries, hernia of, 24
,, hydatids of, 184
,, malformation of, 22
,, melanosis of, 79
,, misplacement, 23
,, myoma, 72
,, sarcoma of, 74
,, secondary cancer of, 78
,, solid tumours of, 71
,, tuberculosis of, 272
Ovariotomy, anæsthesia in, 430
,, cystitis after, 443
,, in advanced life, 220
,, in children, 87, 221
,, incomplete, 441
,, in pregnancy, 217
,, in suppurating cysts, 215
,, mode of performing, 428
,, mortality of, 222
,, repeated, 471
,, risks of, 459
,, ,, embolism, 468
,, ,, erysipelas, 445
,, ,, forceps, 465
,, ,, hæmorrhage, 462
,, ,, insanity, 467
,, ,, intestinal obstruction, 468
,, ,, parotitis, 466
,, ,, peritonitis, 463

Ovariotomy, risks of shock, 459
,, ,, sponges, 464
,, ,, yielding cicatrix, 445
,, the incision, 430
,, triple, 472
,, treatment after, 442
Ovulation, 10
Ovum, apoplectic. (*See* Tubal mole.)

P

Pain, pelvic, 300
Pampiniform plexus, 42
Papillary cysts, 99
Papillomata, 96
Papillomatous cysts, 95
,, infection, 98
Parametritis, 210
Paroöphoritic cysts, 93
,, ,, burrowing of, 93
,, ,, characters of, 93
,, ,, rupture of, 98
Paroöphoron, 3
Parovarian cysts, 104
,, ,, characters of, 106
,, ,, epithelium of, 110
,, ,, fluid in, 107
,, ,, rotation of, 108, 136
,, ,, rupture of, 150
Parovarian cysts, tapping of, 151
Parovarium, the, 3, 104
Pedicle, abscess in, 474
,, anatomy of, 434
,, cauterising the, 438
,, double, 437
,, ligature of, 434
,, mode of tying, 435
,, sloughing of, 473
Pelvic cellulitis, 210
,, peritoneum, 36
Pericæcal abscess, 213
Perimetritis, 210
,, serous, 201
Perioöphoritis, 35
Peritoneum, pelvic, 36
Pregnancy and ovarian cyst, 177
,, cornual, 354, 413
,, extra-uterine. (*See* Tubal pregnancy.)
Puberty, 4
Pyosalpinx, 244, 252
,, causes, 244
,, in uterine cancer, 249
,, symptoms, 293
,, treatment, 302
,, puberty, 4
Placenta, tubal, 333
,, ,, migration of, 337
,, ,, structure of, 337
,, ,, treatment of, 421
Pouch, Douglas', 36
,, ,, diverticulum of, 37, 153
,, ,, recto-vaginal, 36
,, ,, utero-vesical, 37

R

Recto-vaginal pouch, 37
Rotation of cysts, 135
,, ,, acute, 140
,, ,, causes of, 135
,, ,, chronic, 140
,, ,, effects of, 137
,, ,, symptoms, 142
,, ,, treatment, 144
,, of the spleen, 193
,, of uterus in cow, 387
,, ,, in ewe, 389
,, ,, in guinea-pig, 391
,, ,, in hare, 387
Rupture of gestation sac, 321
,, ,, ,, primary, 321
,, ,, ,, extra-peritoneal, 323
,, ,, ,, intra-peritoneal, 322
,, ,, ,, secondary, 343
,, ,, ,, extra-peritoneal, 344
,, ,, ,, intra-peritoneal, 343
,, ,, ,, signs of, 417
,, ,, ,, treatment, 416
,, of ovarian cysts, 147
,, ,, ,, causes of, 147
,, ,, ,, into hollow viscera, 154
Rupture of ovarian cysts, signs of, 151
,, ,, ,, spontaneous, 147
,, ,, ,, traumatic, 155
,, of uterus in a cat, 392
,, ,, in a hare, 387
,, ,, in a jackal, 393
Rut, 12

S

Salpingitis, 235
,, catarrhal, 265
,, cell changes in, 241
,, diagnosis of, 289
,, gonorrhœal, 235
,, in harridans, 255
,, septic, 235
,, treatment of, 301
,, tubercular, 272
Salpingostomy, 451
Sarcoma, ovarian, 74
,, in children, 87
Sarcomata in dermoids, 90
Sex, 1
Sexual characters, 1
,, ,, primary, 1
,, ,, secondary, 3, 475
,, glands, 1
,, ,, effects of their removal, 475
Spleen, 193
,, enlargement of, 194
,, rotation of, 193
,, transposition of, 193
,, wandering, 193

Strumpets, sterility of, 263
Supernumerary ovary, 22
Suppuration in ovarian cysts, 128
,, ,, ,, causes of, 124
,, from appendicitis, 127
,, from intestinal gases, 127
,, from salpingitis, 124

T

Tapping ovarian cysts, 214
,, parovarian cysts, 151
Treatment of ovarian cysts, 214
,, of parovarian cysts, 214
,, of salpingitis, 301
,, of tubal pregnancy, 416
Tubal abortion, 326
,, ,, signs of, 330
,, ,, treatment of, 331
,, moles, 314
,, ,, characters of, 319
,, pregnancy, 307
,, ,, causes of, 308
,, ,, diagnosis of, 396
,, ,, treatment of, 416
,, ,, twins in, 369
,, ,, varieties of, 321
Tuberculosis of the Fallopian tube, 272
,, of the ovary, 276
Tuberculosis, signs of, 278
,, treatment of, 303
Tubo-ovarian abscess, 251, 260
,, cyst, 259
Tubo-uterine gestation, 348
Tubulés, Kobelt's, 104
,, parovarian, 104

U

Urachus, cysts of, 209
Ureters, 43
,, injury to, 133, 419, 460
Utero-sacral ligament, 39
Utero-vesical pouch, 37
Uterus, adenoma of, 265
,, bicornuate, 37, 247, 354, 413
,, broad ligament of, 36
,, retroflexion of, 297
,, retroversion of, 298, 413
,, round ligament of, 38
,, unicorn, 355
,, watery discharges from, 258, 284

V

Vaso-motor disturbances, 485
Villi, chorionic, 320
,, ,, significance of, 320
,, ,, structure of, 320
Vomiting, after ovariotomy, 442

W

Warts in paroöphoritic cysts, 93
,, in parovarian cysts, 110
,, on ovaries, 100
,, on peritoneum, 98

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